News of the Industry Begins Page 83

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LAND AIR WATER

Volume 68
Number 3

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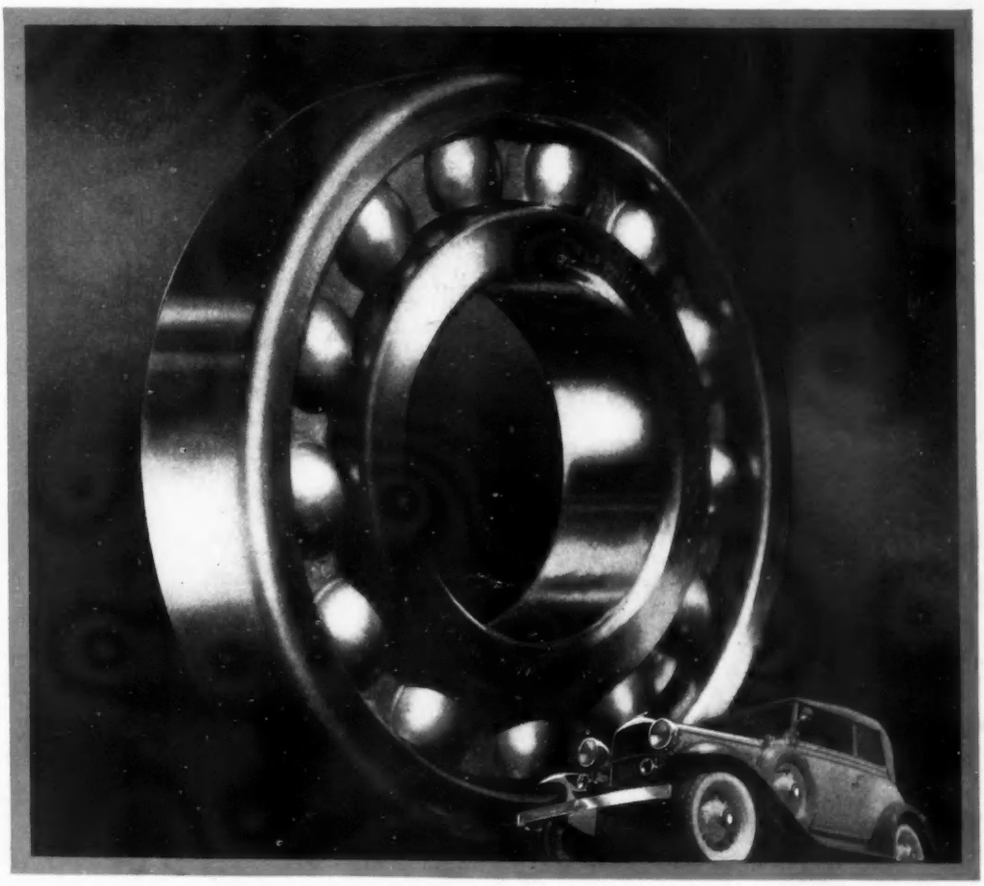

Car Builders Learn a Lesson from Depression

Millions of cars, five, six and seven years old, are on the road today . . . when they are not in the repair shop. Even though many of these cars may not be in the hands of the original owners, yet the public is learning a lot about the life of the bearings . . . and judging the car-makers by the grief or lack of it in their present outmoded transportation.

Ordinarily the public may not ask about the bearing equipment of your new models . . . but from the experience of this depression, it and your dealers, too, will be quick to judge whether your new, lower priced models have been made to last or just built down to the price of another competitor.

And your choice of bearings in that car is, to them, one important indication. For they know, as you do, that "the more New Departures, the longer it lasts."

The New Departure Mfg. Company, Bristol, Connecticut; Detroit, Chicago.

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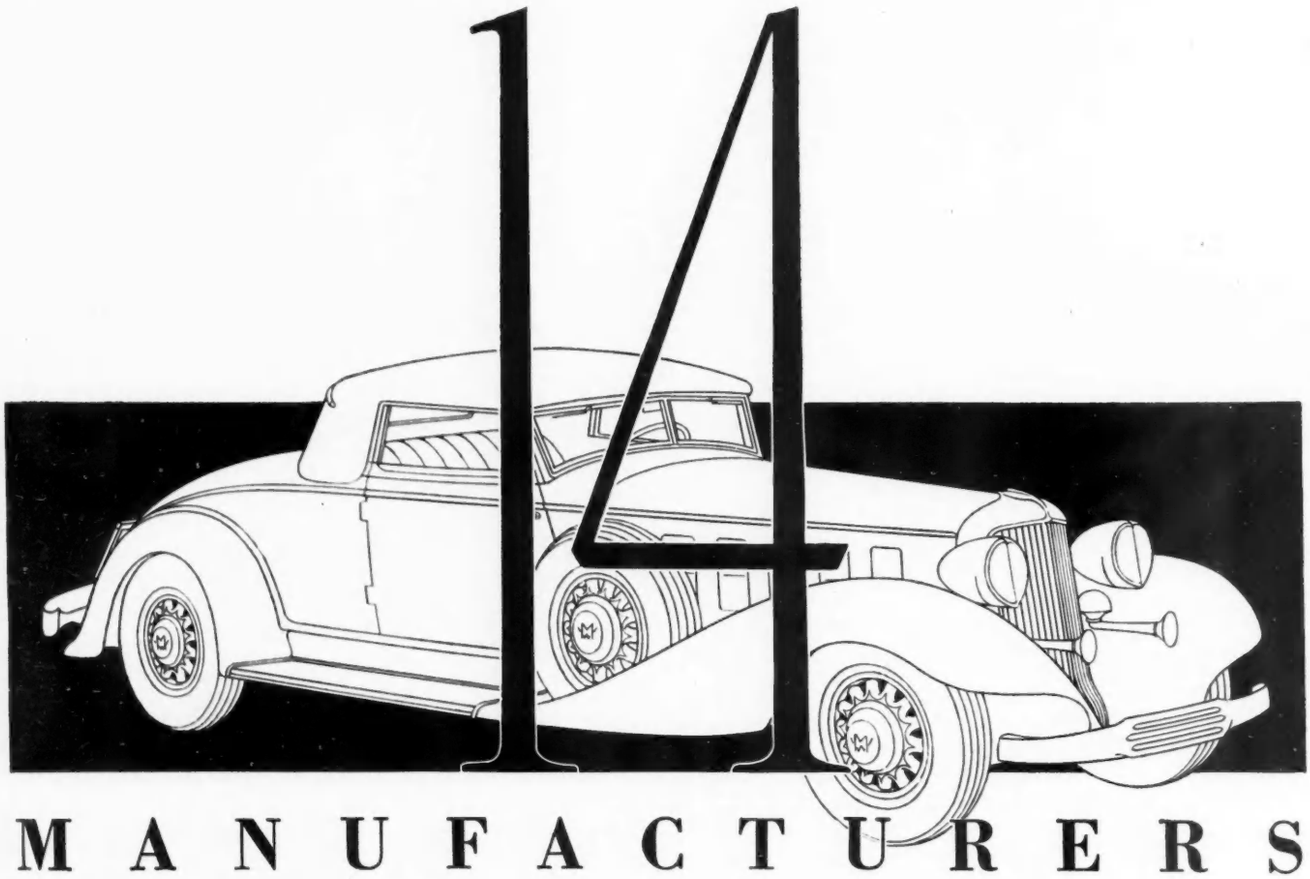

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Present 1933 Models . . . with

CENTRIFUSE

Brake Drums

January 1933 sees not only the lone pioneer of a year ago using Centrifuse Brake Drums, but also 13 other major manufacturers presenting 1933 models with Centrifuse Brake Drums as standard factory equipment.

A rather impressive record this, for a new product, especially in view of the higher cost involved!

Sheer merit, these manufacturers tell us, accounts for the change to Centrifuse Drums. And the user, who is always the final arbiter, emphatically indorses the judgment of these manufacturers by demanding Centrifuse Equipment on each new car he buys.

By getting rid of excess heat instantly and continuously, Centrifuse Drums have at one stroke eliminated the first and most damaging effects of braking friction and in so doing have cured a host of braking troubles.

Summed up, the advantages of Centrifuse Brake Drums result in softer, surer, safer braking and a five-times-longer life of the entire braking mechanism, thereby solving one of the most perplexing problems in car operation and maintenance.

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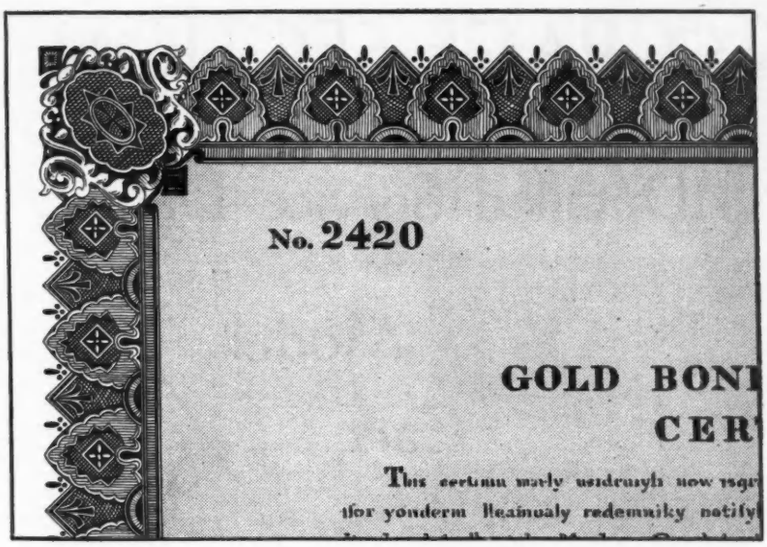
Manufacturers of **Demountable Wood, Steel and Wire Wheels . . . Forged Spoksteel Truck, Bus and Trailer Wheels . . . Industrial Stampings . . .** ***Sole Producers of*** **Centrifuse Brake Drums**



Gilt Edge

THERE'S no better security—none sounder, none more sure in its yield—than Lockheed Hydraulic Brakes on a motor vehicle.

Operators of trucks, trailers and buses, in particular, look upon Hydraulics as a gilt-edge investment; as the cheapest, most practical form of protection; paying liberal yield in safety, in low-cost operation, in freedom from trouble, and in the smooth, business-like way they handle their job of stopping.

HYDRAULIC BRAKE COMPANY
DETROIT, MICHIGAN, U. S. A.

LOCKHEED HYDRAULIC
Four BRAKES *Wheel*

32-PAGE SECTION

of

Detailed Service Data

on

1933 Model Cars

In the

AUTOMOBILE TRADE JOURNAL

Spring Maintenance Number

and

1933 SERVICE MANUAL

APRIL ISSUE—Your Trade Will Use It for A YEAR

Most of this section will be devoted to the presentation of DETAILED SERVICE DATA on the 1933 models —representing approximately 95% of all 1933 sales. On special tinted stock. Bound to be used by thousands of servicemen for the balance of the year.

Nearly 60% of the automotive maintenance work that will be done in 1933, MUST BE DONE in the 6 months beginning April 1—so this APRIL issue has the double advantage of being productive of immediate results, as well as a long-time reference manual.

Give Her The Gas In April!

AUTOMOBILE TRADE JOURNAL

A Chilton Publication

Chestnut and 56th Sts., Philadelphia, Pa.

AUTOMOTIVE INDUSTRIES
THE AUTOMOBILE

Volume 68 — Reg. U. S. Pat. Off. — Number 3

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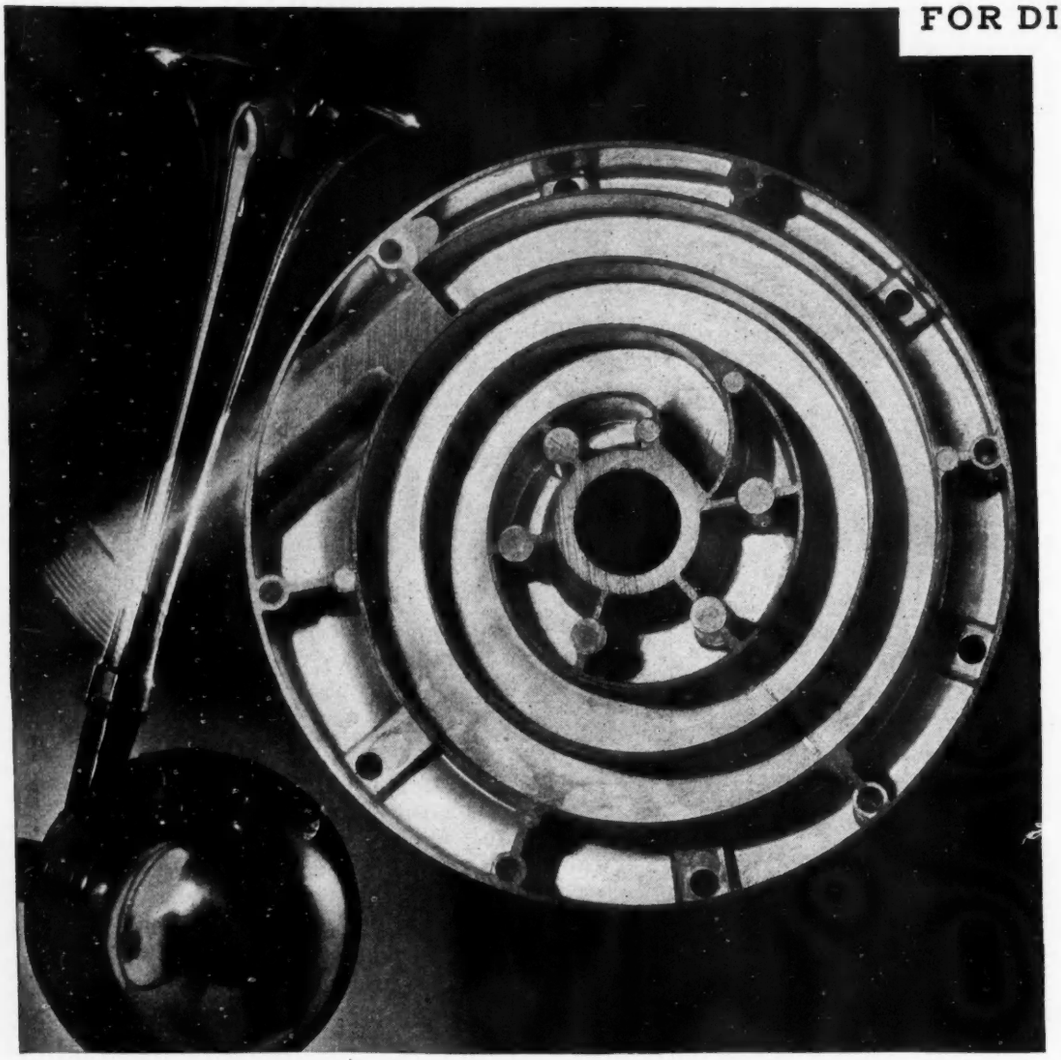

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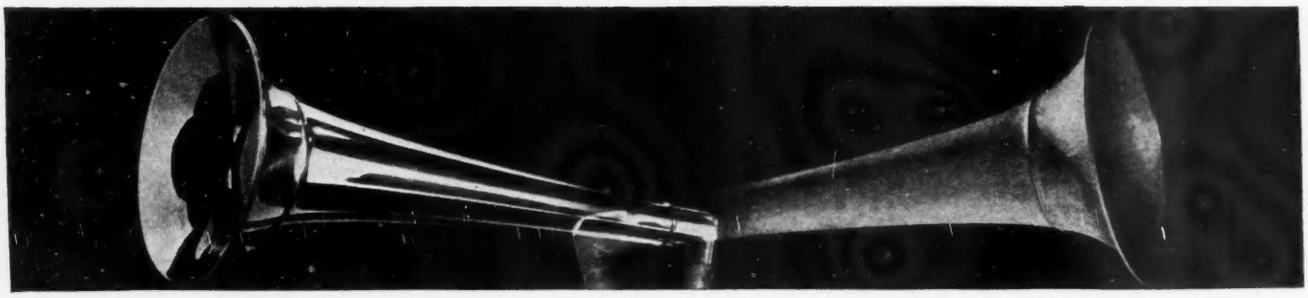
(1) SOUND
AND
(2) BEAUTY

For sound, this body (above) . . . this reproduction of the orthophonic principle . . . is possible because zinc die castings give the designer more latitude . . . a wider working range. It is cast in one piece. The die cast projector (below) has the clear tone of a cast cathedral bell.

Beautiful in line, beautiful in finish is each. A brilliant—and lasting—chromium plate on the projector. Smartness and beauty are in every line and echo. Both are economically produced. Both are die cast of an alloy of Horse Head—uniform quality—Zinc.



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AUTOMOTIVE INDUSTRIES

Vol. 68, No. 3 • THIRTY-FIFTH YEAR • January 21, 1933

Adverse Legislation Threatens Truck Sales

by Ralph J. Staehli
Secretary
Allied Truck Owners, Inc., of Oregon

While the dark clouds of new restricting laws menace, manufacturers of trucks and allied products must fight to save the embarrassment of more lost markets

TRUCK manufacturers wonder why equipment that must be worn out long since is not being replaced. They wonder why their dealers are not getting the sales. They wonder why their own branches can't seem to deal in anything but flocks of "repossessions."

The answer is simple and will be found in the present apparent inability of the industry to shake itself of the spectre of confiscated investments and businesses and the lengthening shadows that cloud the future, because of the constant threat of adverse legislation in almost every state of the union.

Just this week in talking to one of the leading West Coast truck distributors, one of the outstanding successes in the business, the full significance of the present legislative battle between highway and rail transport disclosed itself in a new light. He said: "We can not longer sell a truck on the basis of its apparent earning capacity."

Truck salesmen have been schooled for years in job analysis and fitting equipment to the customer's requirements on the basis of the earning capacity of the equipment. This has always been the logical approach. It has justified more sales than any other approach and most logically.

With that gone as a sales foundation how far is the truck market curbed? What is the prospect for dealer and manufacturer when the basic justification for truck investment can no longer stand as the underlying motive for the purchase and the sale of a truck?

Yet, this is actually happening and will continue to happen until the industry in all its branches from manufacture to operation makes up its mind that the uncertainty of the future regarding weights, lengths, trailers, hours of drivers, permits and taxes and the host of other ideas that fill the papers are quieted or disposed of or until the man on the road who faces the gun of competitive legislation knows that back of him is an allied industry.

If this condition which is stifling markets were true

THE automotive industry is notoriously weak in politics. It likes to assume that it is self-sufficient and it is not. The dealer-mortality in the depression should be one eye-opener. The ability of almost any commercial adversary to take the measure of the automotive industry politically should be another.

of but a limited part of the truck field, it would not be serious. It is easy to assume that only this or that limited group is affected. The fact is that all truck usage is under the gun and that the private owner is as much affected in his decisions as is the for-hire carrier. For proof you have only to scan the following list of items which are the subjects of legislative discussions in practically every state in the Union:

Restriction of trailers; weight restrictions; length restrictions; narrower widths; braking systems; hours of employment for drivers; permits and franchise requirements; operating restrictions; limitations as to classes of service; open and closed roads to certain kinds of traffic; higher license taxes; mileage or gross revenue tax changes; commodity restrictions; railroad competition on the highways.

And yet, one manufacturer wrote me that he was not much interested in legislation.

This same manufacturer recently has been holding old-fashioned sales dynamiting sessions, old "Come on boys—we'll show 'em how" stuff—he, of course, taking the midnight train for the next point, without aiding much to clear the way for sales in this or any other territory.

We'll guarantee right now that his sales will keep on slipping and will continue to slip until the industry as a whole steps into this legislative picture determined to recognize that it is the biggest single obstacle to sales in the truck field today—even greater than the complacent assumption that business hasn't the money with which to buy trucks.

The case of a woolen mill that has prospered on deflation, is an example. The depression made local markets for the mill and it was in the market for a truck. The truck was to serve in distributing semi-finished goods between a plant in Oregon and a plant 45 miles away in Washington.

Truck salesman Number 1, selling a small truck which, with a semi-trailer, could have handled the load, pointed out to the woolen manufacturer that heavier trucks would be barred after the passage of a railroad bill (then pending) and that he would be foolish to buy anything but the light equipment.

Sales are Stifled

The second salesman assured the prospect that to carry his requirements, he would have to use a single truck of ample capacity as the railroad bill (he did not think that the railroad bill could be defeated) would bar the semi-trailer because of engineering requirements. The bill didn't do anything of the kind, but the prospect would have been just as doubtful about it as the salesman had he attempted to wade through the 6000-word railroad initiated measure.

The issue was settled with the woolen mill deciding not to buy a truck.

Until the legislative skies clear a contract carrier with an old overhauled job is doing the hauling. The woolen mill owner is not proud of the equipment but in the meantime he is not going to invest his money in any equipment that may be confiscated by law in 60 days or else be subject to an expensive rebuilding job.

The logging business offers another example of the effect of legislation on a market. My friend in the truck business today would be foolish to sell a truck logger a piece of equipment. So would any factory branch or any dealer in this territory who expected to make anything on the sale of the highly specialized equipment required for the service and had only earning capacity to look to for sales security. This of course assumes that the deal would be a typical log truck deal, one third down or 40 per cent down and the contract to pay out the rest of the purchase price of the truck.

In Washington and Oregon, coming sessions of the legislature are almost certain to work new regulations and restrictions on truck logging.

What assurance has the logger or the truck dealer back of him as to the nature of the final laws?

Manufacturers Seem Complacent

Neither manufacturer nor anyone else is making much of an effort, to date, to shape those laws. Will blind public prejudice, abetted by the railroads and their legal staffs, who see a chance to eliminate some trucks, guide that legislation onto the books, or will truck transportation experts make the few fundamental corrections that will satisfy public demand and still not disturb the operator or the dealer interest?

If the provisions of the late West-Railroad bill in Oregon had become law, 1800 log trucks in that state would have been tied up immediately. Finance companies, first, and dealers after the finance companies had hauled them back out of the woods, would have had a beautiful mess of used equipment to work and weep over.

This bill received but scant attention from purveyors to the transport industry except a small handful of dealers and equipment manufacturers and a few tire companies located on the ground, who visioned the chaos if that bill had passed. The loss to the industry through junked equipment and uncollectable supply accounts would, doubtless, have run well over $500,000, without considering the value of the market for future sales immediately eliminated by the passage of that bill.

Yet, it didn't bother anyone very much except the operators who visioned their families in the bread lines and their life's stakes gone to the junk yard.

The picture might be carried even further. Back of every log truck on the highways of Oregon and

Washington are 40 men and 40 families. That 40 includes the men in the timber, the fallers, buckers, loaders, skidders, swampers and all the others. It includes the sawyers, sorters, carriage men, filers, pilers, handlers, checkers, and others in the mills that waited for the trucks to bring in the logs.

Fifteen thousand men would have followed the truck operators into the bread lines and a lot of private passenger cars would have gone back to the finance companies and the automobile dealers.

And, yet we're told this is an operators' battle!

Operators of Oregon, largely, except for the loyal seven dealers and factories back of them, staved off this calamity to the truck industry. Yet, it was everybody's battle, the battle of everyone who still thinks the automotive industry, in any form, is a field worth fighting for!

If one of the large tire companies supplying the hungry market in the log truck field had visioned some competitor getting away with $100,000 annually of its market, it would have been much concerned. This bill if it had passed would have lopped off a quarter million market for rubber in the logging industry alone. But no one was much concerned about it, except a few local tire dealers who visioned some of their pet accounts going off the books for good.

The effect of the bill on other carriers would have meant that in this one state alone a million dollar rubber market would have been definitely cut off.

In every state within range the same conditions hold true.

The picture is not hopeless and some idea of a new day has appeared in recent weeks in the activity of the National Highway Users Association. This deserves every encouragement but more than that is required. This group is only a beginning.

The automotive industry is notoriously weak in its politics. It likes to assume that it is self-sufficient and it is not. The dealer-mortality in the depression should be one eye-opener. The ability of almost any commercial adversary to take the measure of the automotive industry politically should be another.

Oregon trucking won its first big battle politically only because it refused to apologize to the enemy and played the game just the way the railroads wanted to play it. The truck and allied industries in Oregon were saved a huge potential loss by recognizing legislative hazards as business handicaps and proceeding to remove them. The same thing can be done nationally, but it will never be done under a "let-George-do-it" arrangement.

That is the present attitude of most manufacturers of trucks and of allied products, and why their loss of markets will become embarrassing unless they put behind the legislative fight the active support of their entire factory and field organizations.

Braking Capacity of Four-Stroke Engines

Curves showing the braking power of a conventional four-stroke engine as affected by speed were published in *Automobilechnische Zeitschrift* of Oct. 25 by L. Imendoerffer. The data were obtained in tests made on an Austro-Fiat engine. The chart shows curves N of engine output under full throttle without and with radiator fan, and curves R of braking power, the sub letter L signifying closed throttle, Z ignition on, and W, radiator fan being driven. The results are given in hp. per 100 cu. in. In Fig. 2 the upper curve shows the b.m.e.p. of the engine under full throttle and the lower curve the equivalent b.m.e.p. when the engine is being motored with the throttle in the closed position and the ignition on.

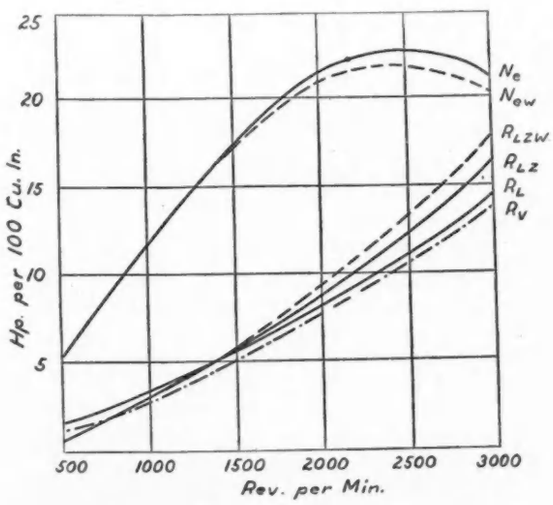
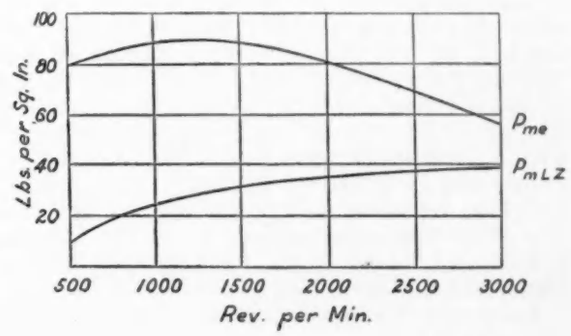


Fig. 1 (left)—Engine output and brake power of engine per 100 cu. in. displacement

Fig. 2 (below)—Brake mean effective pressure of engine under full throttle and when motored



Battery Voltage Variations

—during charge and discharge and their causes are discussed by French technician

VOLTAGE characteristics of lead storage batteries are discussed in an interesting manner by G. Gory in La Vie Automobile. Mr. Gory recalls that the positive plates of a storage cell are covered with lead dioxide and the negative plates with spongy lead, and that the electrolyte is a solution of sulfuric acid in water. During discharge some of the acid is taken out of the electrolyte to form lead sulfate on the plates of both polarities. During the charge, the lead sulfate formed during the previous discharge is decomposed and the acid reenters the electrolyte. These movements of the acid are not instantaneous, and the density of the electrolyte is not the same throughout the cell during charge and discharge. However, there is a constant tendency toward equalization by diffusion.

The voltage or tension at the terminals of a generator is the difference between its electromotive force E and the drop in voltage which results from the current flow. This loss in voltage is equal to the product of the internal resistance R of the generator and the current flow I. The terminal voltage therefore is

$$V = E - R I$$

In the case of a current consuming device (other than those which convert the energy into heat) the equation becomes

$$V = E + R I$$

The plus sign thus replaces the minus sign and the term E becomes the counter electromotive force.

Both of these equations are applicable to storage batteries, which alternately act as current generators and current consumers. When a storage battery is on open current, the terminal voltage is equal to the electromotive force. It will thus be seen that the terminal voltage may be considered under three conditions—with the battery on open circuit while being discharged, and while being charged.

The voltage read at the terminals of the battery while the latter is on open circuit is the electromotive force E of the battery. This magnitude depends only on the nature of the electrodes and the density of the electrolyte in contact with the active material. The effects of temperature and atmospheric pressure may be practically neglected, but it must not be forgotten that variations of the temperature have a considerable influence on the capacity of the battery. The latter increases appreciably if the temperature is increased, owing to the increase in fluidity of the electrolyte.

As regards the density of the electrolyte, a distinction must be made between two cases. If the battery has been idle sufficiently long (some hours) so that the density of the electrolyte is the same throughout, the voltage of the battery remains constant, if periods of a few days' duration are considered only. But since the battery becomes discharged by leakage, in a period which does not exceed a few months, there results a decrease in the density of the electrolyte, which in turn causes the voltage to drop. This decrease in density is less the greater the proportion of electrolyte to active material. It is thus quite appreciable in automobile batteries which contain only little electrolyte; it would be negligible for a battery having several cubic feet of electrolyte to a few grains of active material. As long as the active material is not completely converted into sulfate, the voltage on open circuit is the same. It must be understood, however, that the voltmeter used must have enough internal resistance so that the current taken by it is negligible and the battery therefore may be considered to be on open circuit. This is of special importance in connection with batteries of small capacity. On the whole, if the battery has been on open circuit for several hours, its voltage cannot decrease further, except very gradually, at least not if the materials of which it is composed are of a reasonable degree of purity and there are no short circuits within the cells.

The drop in voltage is substantially proportional to the variations in density. If we consider variations of the order of those which occur in automobile batteries, we may say that the electromotive force varies from 2.1 volts for a density of 32 Baume (1.283 spec. gr.) to 2 volts for 22 Baume (1.178 spec. gr.), to 1.9 volts for 10 Baume (1.074 spec. gr.).

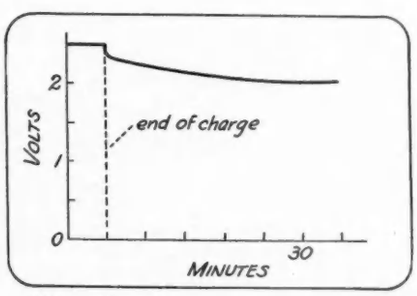


Fig. 1—Variation of battery voltage after the charge is completed

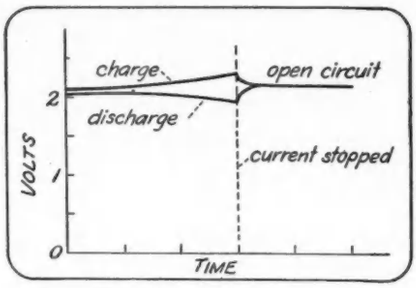


Fig. 2—Effect of rest on the voltage

The second case is that where the battery has been on open circuit only for a relatively short time. If the battery was previously at the end of charge, it had a relatively high voltage, approximately 2.6 volts, which drops rapidly (Fig. 1). If the battery has been on charge, the pores of its active material are filled with a concentrated electrolyte. The concentration decreases on open circuit by diffusion, and as a result the voltage decreases before it becomes stabilized (Fig. 2). If the battery has been on discharge, the concentration of the electrolyte in the pores is low. It increases by diffusion, the more the heavier the rate of discharge; the voltage increases again and becomes stabilized as the concentration becomes uniform throughout (Fig. 2). From the graphs it may be seen that slow variations, which correspond to the diffusion, are preceded by brusk variations which represent the disappearance of the term R I in the equation for V. It is for this reason that there is a sudden increase when the discharge is stopped, and a sudden decrease when the charge is stopped. The change is the greater the values of R and I.

The voltage during discharge varies in accordance with the curve marked I in Fig. 3. Its variation is effected in four different ways which correspond to the four sections limited by points A, B, C, D, and E. Section AB corresponds to the instantaneous drop marked by the disappearance of the term—RI. Section BC corresponds to that period during which the amount of acid in the pores of the active material decreases. Section CD, which is the longest of all, corresponds to the establishment of an equilibrium between the consumption of acid on the plates and the arrival of acid by diffusion. This part of the discharge curve is slightly inclined toward the base line, as a consequence of the gradual decrease in electromotive force which follows that of the density or concentration of the electrolyte, and of the increase in internal resistance due to sulfatation. In the equation $V = E - RI$, if E diminishes and R increases, there results a decrease in V as a function of the time of discharge, provided I is kept constant. Section CD is the most interesting part of the discharge curve, because it corresponds to a stable regime of operation.

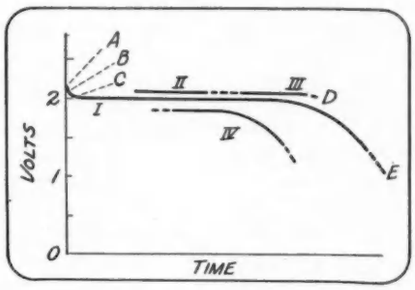


Fig. 3—Variation of discharge voltage

Finally, section ED, which is perceptibly inclined toward the horizontal, indicates by its junction D with CD (which in actuality is not very precise) that there is a lack of equilibrium between the consumption of acid and the arrival of new acid in contact with the active material D is the point marking the end of the discharge, which corresponds to about 1.8 volts for a discharge in 10 hours. Let us now examine the effects of the factors E, I and R on curve I in Fig. 3.

An increase in the density of the electrolyte increases E and, in consequence, gives a discharge curve of the form II, which is above I. At first sight it would thus seem that it would be a good thing to increase the density of the electrolyte, since it gives a higher electromotive force, and also a greater capacity (as a matter of fact, by starting with a higher e.m.f. it takes longer till the minimum permissible e.m.f is reached). Thus automobile manufacturers specify densities upon completion of the charge of 28°, 30° and 32° Baume, while manufacturers of storage (1.239, 1.260 and 1.283 spec. grav.) batteries for stationary uses often specify lower final densities. Unfortunately, it is impossible to go much further with the density of the electrolyte, because this would increase the attack on the plates on open circuit and the internal resistance of the cells.

If the quantity of electrolyte is increased, the change in density during charge and discharge is reduced, and hence also the change in the electromotive force. Curve I is then replaced by curve III, which is less inclined. The advantage is slight and is not sought in automobile batteries, where the demand for compactness and robustness limit the amount of space available for electrolyte.

Faulty maintenance has an effect on E. For instance, if the operator neglects to add distilled water, the electrolyte becomes concentrated and E increases. On the other hand, the capacity is decreased, since not all of the active material is effective and the internal resistance R also is increased. It is therefore impossible to foresee the exact results of neglect in operation for all cases. If too much water is added E is decreased and the curve is lowered, even without taking into account that projections of the liquid on the outside of the cells form leakage paths.

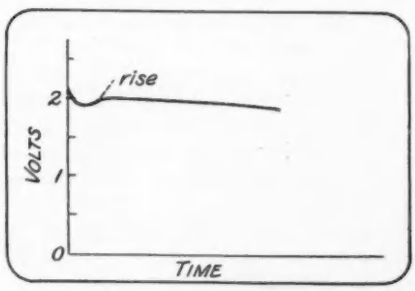


Fig. 4—Details of the start of the discharging operation

An increase in the internal resistance by increasing the term RI, pulls the discharge curve down, the same as a decrease in the electromotive force. But it should be pointed out that, since the loss in voltage RI is effective only during discharge, a change in E depresses point A, while a change in R does not affect the position of A but has its effects on section AB. A change in the internal resistance is almost always a result of neglected maintenance or of a "disease," such as lack of water, sulfation, breakage of straps, etc.

Sometimes it is noted that after the drop in voltage following the end of the charge there is small increase (Fig. 4). This rise in voltage is due to a decrease in the internal resistance due to heating of the electrolyte by the Joule effect. It must not be overlooked that an increase in the temperature of the electrolyte corresponds to a decrease in its resistivity, which is the opposite of what holds true for metals.

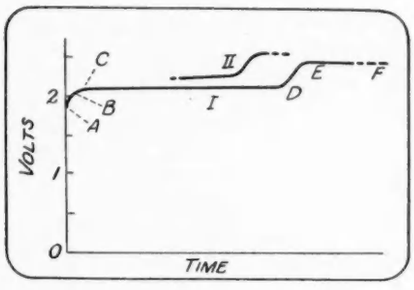


Fig. 5. — Terminal voltage during charge

The rate of discharge has a very marked effect on the electromotive force. In fact, the loss of charge is proportional to the current flow, and multiplying the current strength by hundred amounts to multiplying the loss by hundred. Therefore, in spite of the smallness of R, which is of the order of one-hundredth of an ohm, the loss of voltage is considerable at high discharge rates. The voltage of a starter battery, which is fully charged and in a good state of repair, may drop during the starting operation to 1.4 or 1.5 volts. The current acts in still another way. When the current strength increases, the rate of acid consumption increases and there is an increased difference between the density of the electrolyte in contact with the plates and that of the mass of electrolyte. The relative slowness of diffusion then translates itself into a momentary lowering of the electromotive force and of the terminal pressure. Finally, since the active materials become sulfated more rapidly, the insufficince of diffusion of electrolyte into the pores becomes noticable earlier and the hook at the end of the discharge curve. (Fig. 3) appears sooner. The voltage curve IV, for a high rate of discharge, is lower, more inclined and more curved than curve I, which corresponds to a lower rate of discharge.

In normal cases the terminal voltage on charge varies in accordance with curve I of Fig. 5. This curve may be divided into five sections. Part AB represents an instantaneous rise which corresponds to the appearance of the term RI. Part BC corresponds to the increase in the density of the electrolyte in the

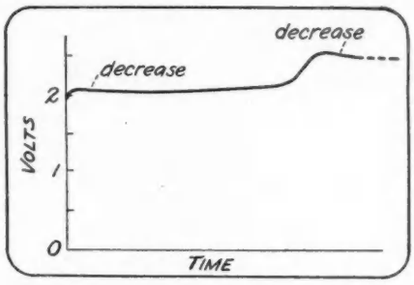


Fig. 6 — Details of the charging voltage

pores of the active material as a result of the decomposition of sulfate. Part CD indicates stabilization of the e.m.f. around 2 volts. As a matter of fact, diffusion intervenes to reduce the rate of increase in density, and the decrease in the resistance by desulfatation compensate in part or the increase in the electromotive force resulting from the increase in the density of the electrolyte as a whole. Part DE of the curve corresponds to a rapid rise of the density toward 2.6 volts. This bears a relationship to the end of the process of desulfation and to the decomposition of the water by the charging current, which has no longer anything else to do. The horizontal section EF indicates that the charge is completed, at least as far as the finely divided sulfate is concerned. Sulfate in large crystals or in a compact mass cannot be decomposed, in spite of the rise in the electromotive force. One can be sure of this point if the maximum density specified by the manufacturer is not accompanied by stabilization of the terminal voltage.

We may now examine, the same as for the case of discharge, the particularities and anomalies in the variations of the terminal voltage on charge which may result from variations in E, I and R, and the factors on which they are dependent.

An addition of acid, or a replacement of acid by water has the effect of a change in the density of the electrolyte, a change in the electromotive force, and hence a vertical displacement of the voltage curve. It is not inapropos to repeat that the addition of acid solution is not called for, except in cases of loss of acid through upsetting of the battery or through leaks.

A change in the internal resistance has a similar effect on the charging voltage as it has on the discharging voltage, but the displacement is in the opposite direction. It may thus be stated that if a change in E displaces the curves of charging and discharging voltage in the same direction, a change in R displaces them in opposite directions. This is due to the fact that E is preceded by the same sign in the equations for charge and discharge, whereas RI is preceded by different signs in the two equations.

Sometimes it is noticed that the rapid rise of voltage at the start of the charging operation is followed by a slight decline. This is due to the reduction in the internal resistance which is noted when the first layer of sulfate is decomposed (Fig. 6). This lowering may not be apparent if its cause is masked by others acting in the opposite direction. Sometimes it is found also that if the part EF of the curve in Fig. 5 is extended, a drop in voltage occurs which is indicated in Fig. 6. This is due to the diminution in the electromotive force which follows the diffusion of the last acid liberated in the plates.

JUST AMONG OURSELVES

Pat Harrison Cheers Exporters

SENATOR PAT HARRISON sent the export men away happy from the N.A.C.C. dinner last week, what with his talk of expanding foreign trade, reciprocal tariff agreements and whatnot.

Engineers of the industry had already pleased the export group in many of the 1933 design features. Some smaller engines, bigger gas tanks, less than standard treads, low prices and several other features would seem likely to help in overseas trade.

Conditions Demand Sane Advertising

EVERY company, of course, at different times has varied the reliance it has placed on different forms of advertising. Yet if one watches the practices of individual companies (which have remained under the same management), strong, permanent predilections in favor of one form as against another stand out. And, frequently, it would seem, large advertising sums have been spent in a particular form of advertising because of the strong prejudice of some major executive *against* another form.

Advertising has made great efforts and achieved some success in recent years because its effects upon persons whom it reaches has been scientifically analyzed.

But the day has not yet passed entirely, when many executives consider their own "reactions" as sufficient analysis of a particular campaign, type of copy or advertising program.

And it is because of this, partly, that advertising budgets suffer severely in a time like this when business needs dictate as little pruning as possible—because nearly every executive has *something* against every form of approach to customers that can be offered.

Never before was there so great a need for general executives to honor the plans of their advertising departments with the same scientific attitude that they long have tended to give to their engineering problems.

Consumer Research Reveals Potent Facts

IT'S interesting to note, too, the relatively small amount of work which has been done in consumer research from an automobile standpoint as compared to the amount of effort put on finding out how best to impress the consumer.

It's perfectly true that the public doesn't know what it wants. But too many have been willing to let it go at that. Somehow or other the manufacturer must provide something which the public does or can be made to want. And insofar as he manages to strike on what is wanted, he saves thousands of dollars which otherwise would be needed to make the public like what he has built.

Some day, we predict, consumer research will come into its own as a major factor in automotive marketing—even if it uses up part of the advertising budget!

Avast, There, Ye Flu Bugs!

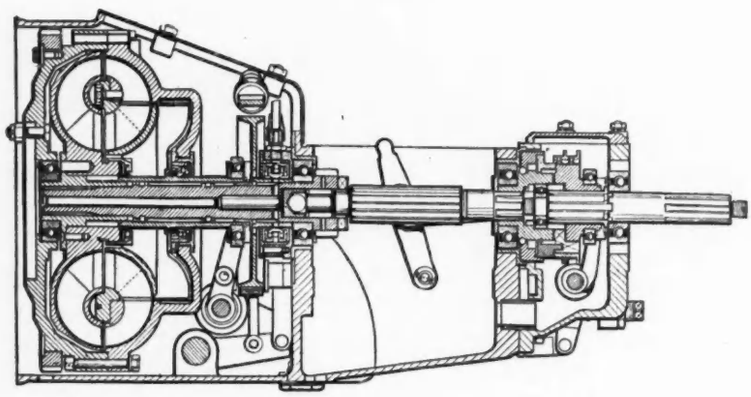
WE think we've done pretty well to come so close to the end of this page without once mentioning influenza, when we had such a swell chance to follow the lead of so illustrious a columnist as Heywood Broun and write a whole page about how badly we have been feeling since Thursday of New York Show Week.

But plenty of you readers have been battling the nasty germs yourselves. And we feel as though fevered thoughts and cold chills wouldn't be news in the automobile business any more. Anyhow, after what happened in 1932. We are pleased, nevertheless, to shake enough of the bacilli to permit hoisting a portable onto our outstretched legs, prop a woozy head up in bed, just make the deadline for this copy and preserve record of more than a decade of unbroken writing of J.A.O.

We'll hope to give you less fever and more sense next week. Cheerio! N.G.S.

The Salerni Transmission

Combines—— a Fluid Flywheel with a Continuous Mesh Transmission



Sectional view of Salerni transmission

THE Salerni transmission, which combines a fluid flywheel and a positive coupling with a conventional sliding-gear or continuous-mesh transmission has been introduced in this country recently, as announced in our issue of November 19. A sectional view of the assembly is shown herewith. In this the details of the transmission proper are omitted, because any conventional transmission may be used. The inventor of the transmission is Commendatore Piero Salerni of London, England.

From the sectional view it will be seen that the fluid flywheel is similar in most respects to the Daimler fluid flywheel. Its novel feature consists in the provision of a slide valve, which can be operated by a pedal on the toe-board corresponding to the clutch pedal. When this pedal is depressed the valve is shifted in the direction toward the engine and closes the passages for the fluid through the driving member of the "fluid flywheel." To make possible a quick stop of the driven member and of the gears connected to it, for easy shifting, a friction brake is provided in the housing enclosing the flywheel.

The Salerni mechanical coupling, which was illustrated and described in *Automotive Industries* of May 18, 1929, comprises two sets of jaws, of which one set is axially movable while the other is stationary. The design is such that once the clutch is disengaged, it cannot engage again until the two members have first been brought to the same speed.

When the pedal is depressed, previous to a change of gear, the first effect is to shift the annular sliding valve into the closed position, so that no torque can be transmitted through the flywheel. Further movement of the pedal disengages the mechanical coupling to the rear of the transmission, while the last part of the range of pedal motion applies the friction brake and brings the driven member of the fluid flywheel to a quick stop. Since the transmission is now completely disconnected from both the engine and the driving axle, any shift can be made without clashing.

The pedal is provided with a retracting spring, and when the driver removes his foot from it, the first thing that happens is that the clutch brake is released. Owing to the drag in the fluid flywheel, the gears in the transmission will then turn over slowly, but since the driving member of the mechanical coupling cannot attain synchronism with the driven member, the coupling will not engage. If the pressure on the pedal is completely removed and the pedal therefore returns to its released position, the annular valve will be completely opened, but since the engine is throttled down, there will be practically no transmission of torque. This is the free-wheeling position.

If the driver now presses down on the accelerator, the engine will be speeded up, and as soon as the driving member of the mechanical coupling reaches synchronism with the driven member, the coupling will engage and the engine will take up the drive.

It is claimed that practically no skill is required in the operation of this transmission. The characteristic feature of the Salerni transmission is that friction is not depended on for the transmission of the torque at any point of the drive.

FROM England comes word that the British Air Service, which about a year ago started to convert a Rolls-Royce Condor aircraft engine to a Diesel-type engine by strengthening its parts as required until the engine could meet the type test, has completed this part of the undertaking. In this work the engineers of the Air Service cooperated with the engineering staff of the Rolls-Royce firm. The engine has a nominal output of 480 hp. at 1900 r.p.m. and a maximum output of 500 hp. at the same speed. Its weight is 1504 lb.

1932 Stimulated Ingenuity of Machine Tool Designers, Introduced New Materials

By Joseph Geschelin

WHAT has the past year or so contributed to the forward march of automotive manufacture? Research, invention and development are at the root of the answer. But those close to their own operation, fully cognizant of the curtailment of their own programs, honestly question how research has fared elsewhere. Indeed some executives with whom we have talked recently, question whether it has fared at all!

Actually, unusual progress has been recorded in the past year in the development of productive machinery, processes, and new engineering materials. The record is indelibly written in the pages of *Automotive Industries* in the period embraced by the Production Issues of 1931 and 1932.

Accordingly, we propose to summarize some of the high spots in broad strokes of the pen rather than in lengthy detail. Please remember that this summary in nowise covers the entire gamut of activity—time and space permit only a fleeting glance.

It was Guy Hubbart who said at the last National Metal Congress, that in the course of American industrial history business depression has stimulated and quickened the pulse of invention in the machine tool industry. Thus the slough of 1857 saw the birth of the first commercial turret lathe. Out of the Civil War, 1861-1862, came the first universal milling machine. 1873 stimulated the first automatic screw machine; 1893 brought forth the first commercial multiple-spindle automatic.

The trying period from which the Nation now is slowly emerging has been immeasurably more fruitful in invention and development than any that has gone before.

In the production process, it has manifested itself in three directions:

1. Improved manufacturing equipment.
2. New and improved processes.
3. Introduction of new or improved engineering materials.

Consider one example. Although cemented tungsten carbide tools were not introduced until 1928, by 1931 machine tool design had been so profoundly influenced that almost over night production equipment engineered to meet the demands of the new tooling was on the market. In contrast, we are told that it took almost 20 years before high-speed-tool steel was accommodated in metal cutting machines!

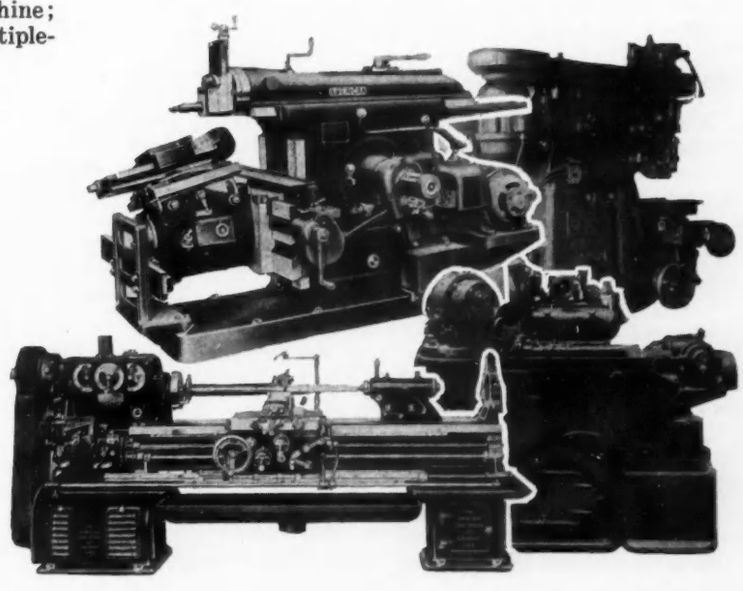
As a matter of fact, the full benefits of high-speed-tool steel are being realized only now during the general adoption of cemented-carbide tool materials.

Eye-appeal has become a basic factor in machine tool design. Not simply the process of hiding gears and rounding lumps, but the actual blending of mechanism to conform to pleasing lines. It is only natural that this should be followed by colored finishes conforming to any given decorative scheme in the factory.

These things cost money; they are represented in the selling price of the machine. But they are demanded. One prominent car builder has set the fashion in building factories as show places for his public. He and many others believe it is good advertising. From the machine tool builders' point of view, it is also good advertising because it infers hidden qualities in his product.

In general, the modern machine tools emphasize flexibility-adaptation to change in the design of the product. This is aided by the tendency to provide an increasing number of speed and feed changes to accommodate variations not only in productivity but in the demands of new tool materials.

Going further into the specifications of the current machine tools, we find that they stress such factors as great rigidity and power essential to meet the demands of cemented-carbide tooling; hydraulic mechanism in many cases; an increasing use of anti-friction bearings to meet the demand for greater precision and higher speeds.



Welded construction is being extended in the building of frames and bases of huge presses, boring mills, etc. By replacing cast iron, weight is greatly reduced, although the resulting rigidity is usually better than before.

As a rule, process and the machine are so intimately wedded as to be inseparable. We shall maintain this relationship in the following.

Steel body building has contributed generously to the art of die making and to deep drawing lore. Earlier in the year we described a body side panel drawn in one single piece from the rear panel joint up to and including the cowl. This was deemed impossible just a short time back.

Concurrent with the advance in the art of metal stretching we find accelerated activity among press makers. Presses are huge, rigid, more powerful. They are being built with triple and quadruple action to meet every demand.

Even tool room equipment has swung with the pendulum. Just a few weeks ago one of the best known machine tool builders introduced a die sinker which is claimed to cut costs by 75 per cent. This move is felt in other types of equipment such as jig borers, and Keller automatics.

Gear perfection has come to the fore with the public's insistence upon quietness. Behind it we have a variety of gear finishing machines each with its own special method of attack. Thus there is a burnishing machine for correcting soft or carburized bevel gears. In this machine, the gear is run between three master gears under controlled pressure. Another make, laps helical gears to correct spacing, tooth thickness, and form.

One finishing machine recently introduced operates on an entirely new principle. Gear shaving as the process is termed consists in cutting gear teeth with painstaking precision by means of an involute rack over which the gear blank is rolled and fed. Another remarkable machine finish-grinds tooth form, spacing, etc., within 0.0002 in., by means of an abrasive wheel which is automatically reciprocated and fed. This machine with suitable changes may be use for spur or helical gears or worm wheels.

Recent months have seen the adoption of horizontal diamond boring machines employing the diamond or cemented-carbide tools. These machines are very flexible and capable of high production rates. We saw a set-up in an automobile plant recently where two such machines are expected to finish-bore both ends of a connecting rod to the tune of 6000 a day (8 hr.)

Materials Handling

Materials handling, of course, remains the backbone of mass production or any other kind. There is an increasing use of magazine feeds for automatic machines, particularly the centerless grinder which utilizes some truly remarkable mechanisms. Again there is automatic loading for a single machine or a battery.

One manufacturer in this field recently introduced roller conveyors equipped with anti-friction bearings hermetically sealed, thus solving an old problem of the foundry industry where maintenance has been a sore spot due to the action of abrasive dust.

Industrial trucks continue to widen their scope of usefulness. Recently we described some of the latest improvements in fork trucks for handling bodies, and tiering trucks with unusual telescoping range and exceptionally short turning radius.

Bright chrome plating has made more progress during the past two years than in all its previous history. It is now possible to control the process so as to produce a beautiful finish having great durability. Moreover this can be done at less cost and with fewer rejections.

The latest development in this field is the application of chromium coatings to production tools or certain kinds, such as files, drills, reamers, broaches, etc. The process increases the life of small tools and also serves as a valuable salvage means. To facilitate this new activity, a compact, self-contained plating unit has been designed for installation in tool rooms and production departments.

In a related activity, several manufacturers have developed automatic buffing and polishing equipment for finishing electroplated as well as stainless steel products. These machines, too, are very flexible and have high productivity.

Welding has advanced by leaps and bounds. One important development so far as general acceptance goes, is the increasing use of water-cooled electrodes with the cooling effect carried directly to the welding tool.

Lubricating Machine Tools

Another activity is the spreading of the art of fabricating heavy press dies, jigs and fixtures, etc., by a technique of heavy-duty gas flame cutting and welding. This cuts first cost, reduces weight, increases salvage value.

Shot welding has entered the picture. It is a controlled process of producing perfect welds in stainless steel. Its basis is automatic control of welding current, pressure, and particularly the time element. This is a milestone in the art of welding.

Heat-treating has undergone some revolutionary changes. The introduction of nitriding steels has been followed by the development of a semi-continuous nitriding furnace which is said to cut down the length of the heating cycle and produce better uniformity.

This is paralleled by the introduction of an automatic cyaniding furnace, the first signficant change in cyaniding from time immemorial.

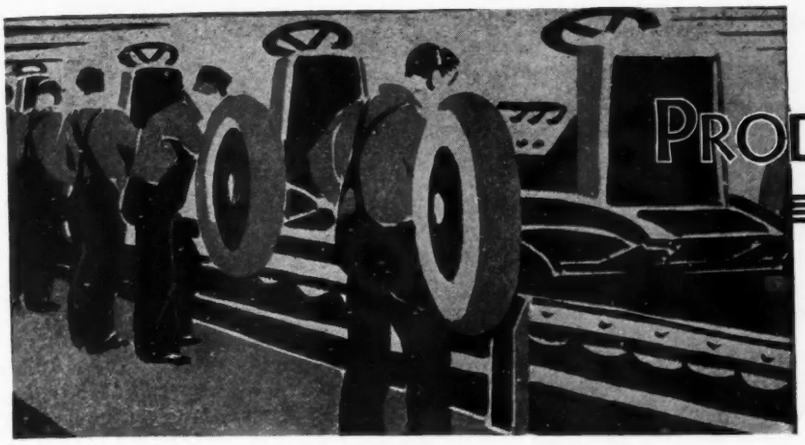
Electronics continue to invade the production field. Although the electric eye (photocell) is not yet widely used in the automotive industry, much is being learned elsewhere and the knowledge percolated through little by little. The success of electric measuring devices and inspection gages needs no further comment here.

The demand for better product finishes has created a flurry in the metal cleaning end of the business. For small parts, there are a number of valuable methods of cleaning and degreasing. An electrolytic method has been described recently. But the greatest scramble has occurred in various methods of vapor and liquid phase degreasing. This has produced a number of new washing machines; also an increasing use of numerous solvents particularly of the chlorinated type.

Development of useful engineering materials has been particularly fertile. It reaches in every direction, touches every avenue of automotive activity. Here for instance is a further push into cemented-carbide tooling; the introduction of tantalum; mixtures of tantalum and tungsten carbides; a widening horizon due to the birth of many grades designed to suit the needs of different metals.

Nickel alloys are spreading. Only a few weeks back we were told of a research project designed to investigate the properties of nitriding steels alloyed with nickel.

(Turn to page 80, please)



PRODUCTION LINES

Hang It Up

Through the courtesy of Tom Wickenden of the International Nickel Co., a nine-inch circular slide-rule chart on nickel cast iron adorns our wall. It's one of those charts that takes the place of a handbook full of tables. Intended for engineers, metallurgists, and foundrymen, it gives at a turn of the inner dial, the composition, physical properties, and necessary heat treatment for any of the gamut of parts made in nickel cast iron. If you mention where you got the tip, we can guarantee you a copy.

Pudding Proves It

An amusing incident in connection with motion study is told by Walter R. Coley, f.m. of Leeds & Northrup. Action takes place at a luncheon where he was to expound the virtues of motion study to a group of executives. Somebody was motion-minded. So when the speaker took his place at the table, he found a rigging consisting of an upright with a cross-bar from which dangled long, elastic coil springs. At the end of each spring was an eating tool . . . properly prepositioned. He had to eat his method.

Brighten Up

A good chrome plating job is reported in *The Motor* (London). It concerns an exhaust pipe plated right up to the ports which remained clean and bright after some 28,000 miles of running. The art certainly has progressed in the automobile world.

Good Balance

As our knowledge of metals and other engineering materials grows, we approach more closely the ideal situation of balanced design in automotive units. Thus the time may come when the principal units such as the engine, transmission, rear axle, etc., have about the same useful life. One of the biggest benefits arising from this knowledge of engineering materials will be the elimination of unnecessary weight. Research is developing many hitherto unknown factors and properties. The more we know about them, and the sooner we get the information, the sooner will we be able to eliminate the "factors of ignorance" which are responsible for excess weight.

New Deal

De Vilbiss tells about their new fluid hose which is being fabricated with a lining of Thiokol. This rubber-replacing material renders the hose impervious to the action of solvents and oils. It also imparts unusual resistance to bending, twisting and wrenching.

For the Centerless

Grits and Grinds, Sept.-Oct. 1932, has a mighty fine article on grinding wheels for centerless grinding operations. A new bond and structure control combine to do the trick.

Red Hot

Kept at a temperature of about 1400 deg. F., by means of an oxy-acetylene torch, a J-metal tool continued working for 16 hr. on a billet of hot rolled steel. When the tool was removed and cleaned up with a stone it was found to be in good condition and ready for another job. Some demonstration of re-hardness, what?

Same Level

Another proposal for the standardization of tests for metal-cutting tools is made in *Mechanical Engineering*, October, 1932. R. C. Deale, the author of the article, stresses the need for standardizing the data necessary in metal-cutting tests, standardization of test procedure and criteria of tool life. The theme is to produce results which are comparable or may be made comparable. This would provide a means of comparing on an equivalent basis, the performance of different tool materials and particularly of newly introduced tool materials.

Good Spirit

"All Inland Workers Inspect * * * Many Do Nothing Else," is the message in a recent advertisement by Inland Steel. We like it. It seems to exemplify the spirit of modern manufacturing whether it be steel or automobile parts. Quality has become intrinsic.

Condenser Control

Heard some talk about spot welding with energy source and positive control vested in electrolytic condensers. By this medium, it is said that the amount of current and rate of discharge or application could be accurately held.—J. G.

MANUFACTURING MANAGEMENT METALLURGY

Chevrolet Commercial Line for 1933

FOR 1933, the Chevrolet commercial line consists of three models as formerly, the 108 9/16-in. wheelbase light delivery, and the 131 and 157-in. wheelbase trucks. Axles, clutch, steering mechanism and wheels of the light delivery car are interchangeable with the corresponding passenger-car units. Engines, however, are the same as those used in the heavy-duty trucks. The transmission in the light delivery is the same as that in the passenger cars, including the synchro-mesh design, but omitting the freewheeling unit. Sheet metal parts and radiator conform to those in the truck line. Frames represent a modification of the 1932 passenger-car frame.

The 131-in. wheelbase truck is supplied with either single or dual wheel equipment. It has a 6½-in. deep frame, a four-speed transmission, a 10-in. clutch, heavy-duty front and rear axles, and a special truck engine. It is rated, as formerly, at 1½ tons, making the allowable gross weight of 7500 lb. with single, and 8300 lb. with dual wheels.

The 157-in. wheelbase truck is rated at 7900 lb. with single and 8300 lb. with dual wheels. Except for the frame it uses the same major units as the 137-in. model.

Comparing the light delivery unit with the 1932 model, a number of differences are found aside from those duplicated in the passenger cars. Frames compared with 1932 have wider front and rear cross-members. There is a heavier gage exhaust pipe and a tail pipe of larger diameter. Engine power has been increased, and details concerning this change will be given in connection with the larger trucks. The engine mounting is the same as that on last year's passenger cars, not as flexible as the 1933 passenger-car mounting, but imparting greater smoothness than in

Prices of Chevrolet 1933 Line

Chassis	½ ton delivery	1½ ton 137 in.	1½ ton 157 in.
1933 ...	$330	$480	$510
1932 ...	355	520	575

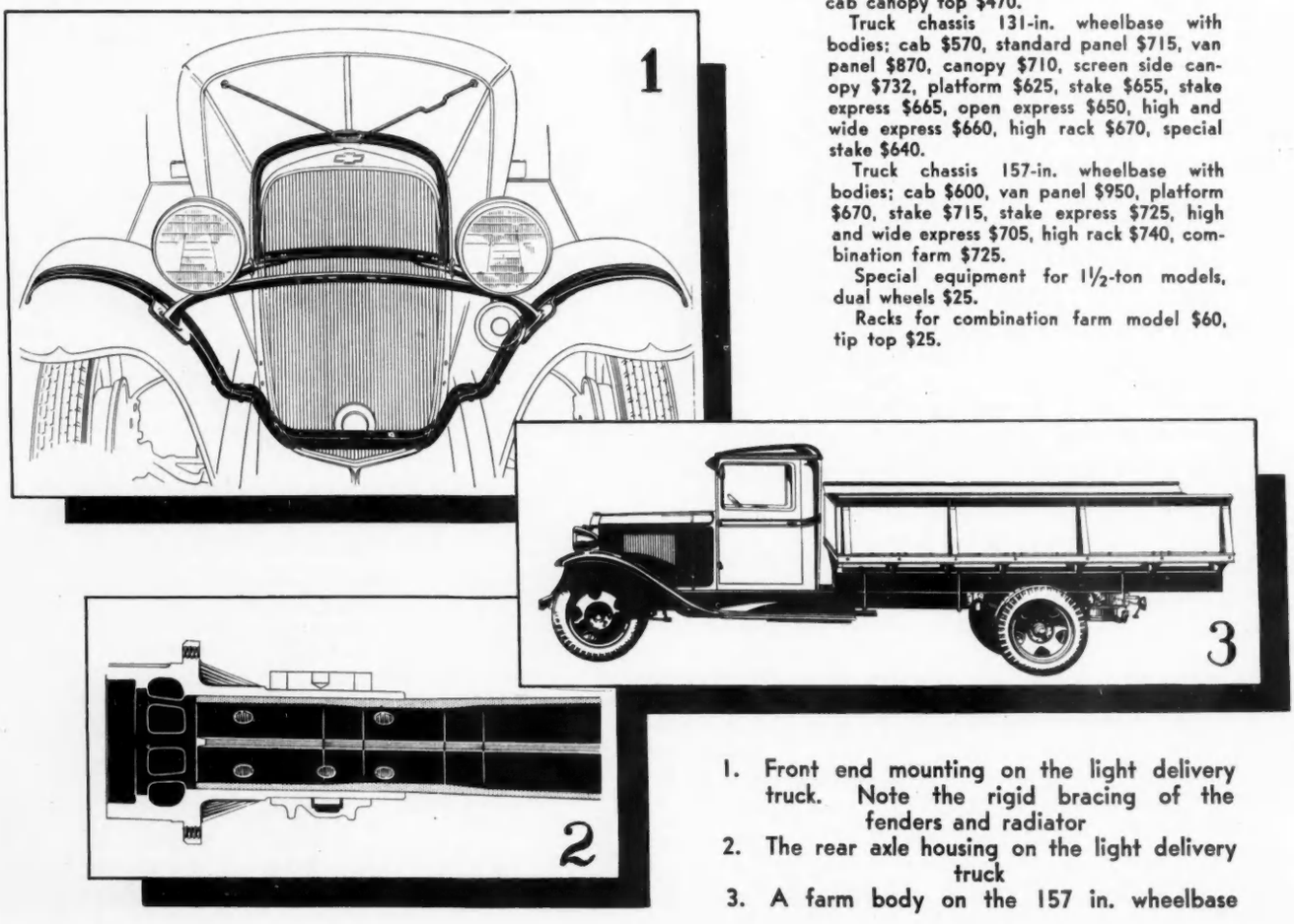
Delivery chassis with bodies; sedan delivery $545, standard panel $530, special panel $545, canopy $525, screen side canopy $544, closed cab pick up $440, closed cab canopy top $470.

Truck chassis 131-in. wheelbase with bodies; cab $570, standard panel $715, van panel $870, canopy $710, screen side canopy $732, platform $625, stake $655, stake express $665, open express $650, high and wide express $660, high rack $670, special stake $640.

Truck chassis 157-in. wheelbase with bodies; cab $600, van panel $950, platform $670, stake $715, stake express $725, high and wide express $705, high rack $740, combination farm $725.

Special equipment for 1½-ton models, dual wheels $25.

Racks for combination farm model $60, tip top $25.



1. Front end mounting on the light delivery truck. Note the rigid bracing of the fenders and radiator
2. The rear axle housing on the light delivery truck
3. A farm body on the 157 in. wheelbase

3 Offered on Choice of Three Wheelbases

the 1932 Chevrolet light delivery. There are four points of support, at the front, on opposite sides, and at the rear respectively. All are rubber-insulated.

New features of the fuel system include a larger, baffled tank, a filler located on the side and provided with a vent pipe, a spring-and-cam filler cap, and a new T-bolt strap mounting for the tank.

The bracket by which the steering gear is mounted on the frame is now stronger. Front fender mounting is at the center, the fenders and radiator being mounted on a separate cross-member flexibly attached to the chassis at the center at one point. Front and rear fenders have deeper crowns than formerly. Other features include a new radiator splash guard, improved running boards and aprons, a reinforced hood, rubber cushions between hood and cowl, a single hood lock and lift handle, and a single arched U-section tie-bar between headlamps.

Headlamps are longer and fitted with convex lenses. Instrument panels follow the 1933 passenger car practice. Radiator grilles are of the built-in type, and shells are reinforced and braced to the headlamp tie-bar. Radiator cores are all copper.

A braced fender well carrier on the left side is standard for the spare wheel. The cab windshield has shatter-proof glass and the cab structure is generally stronger. Windshield hinges have been improved and a one-piece leak-proof weatherstrip is provided.

The popular panel body on this chassis has embossed molding in the upper side panels, a French type top, steel door trim panels, shatterproof glass windshield, double weatherstripped; a form-fitting adjustable driver's seat; an improved rear door lock, a stronger rear cross-sill, and a sponge-rubber filler-seal between side panels and roof. The fuel tank is now at the rear of the frame.

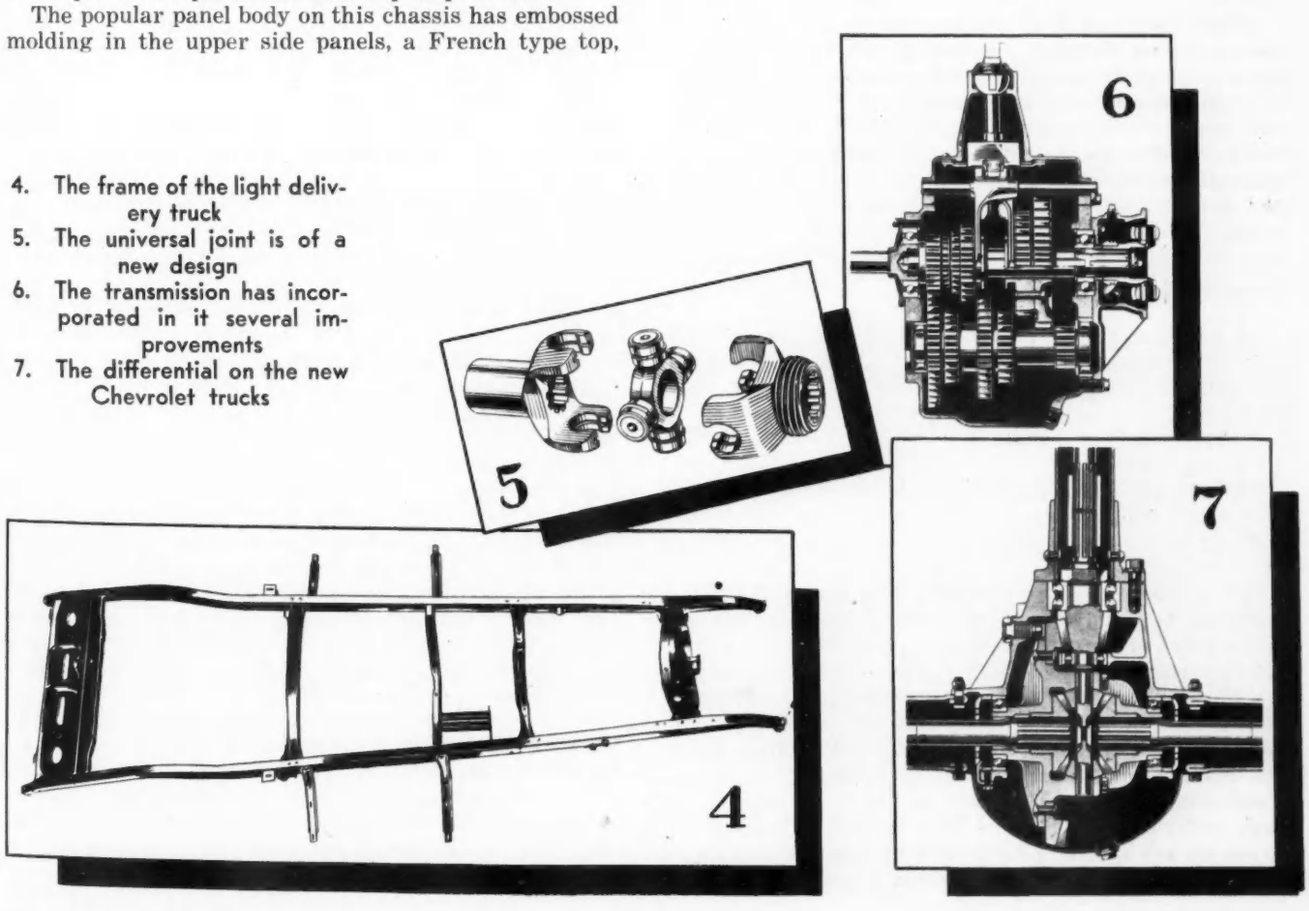
1933 Truck Models

The engine which powers the entire Chevrolet commercial vehicle line incorporates all of the developments found in the Chevrolet 1933 passenger-car engine. Engine output has been increased to 56 hp. at 2750 r.p.m. There has been an even greater increase in output at lower speeds and at 2000 r.p.m. the engine delivers 51 hp., while the peak of its torque curve, 146 lb.-ft., is reached at 1000 r.p.m. At the rear end of the engine the rigid mounting is retained, while at the front the spring mounting has been replaced by the same rubber unit now used on the light delivery.

Clutch and transmission improvement are minor in character. The universal joints, however, have been redesigned for greater strength. Both lines carry the same joints, but the fitting dimensions, which correspond to those of the shafts connected, are different.

(*Turn to page 78, please*)

4. The frame of the light delivery truck
5. The universal joint is of a new design
6. The transmission has incorporated in it several improvements
7. The differential on the new Chevrolet trucks



Spot Welding Stainless Steels Demands Careful Control for Good Results

By V. W. Whitmer
Metallurgist, Republic Steel Corp.

STAINLESS steels are particularly well adapted to spot welding, due to their clean surface, freedom from any oxide or scale, and because of the absence of any coating such as zinc or lead, as on galvanized or Terne Plate stock.

Spot welding, in principle, is nothing more than holding two sheets in close contact between two copper electrodes about an inch or so in diameter, with the contact ends tapered to about ⅛ in. in diameter, and passing a current low in voltage but high in amperage through the circuit for a short period. Fusion immediately takes place between the two sheets, while the excess heat is rapidly carried away from the outside surfaces by the water-cooled electrodes. The low voltage, about 2 to 4 volts, is obtained from a step-down transformer wound in sections, each being connected with a stop on a rotary control switch by which the current or heat can be increased or decreased by turning up or down respectively.

While the total heat applied will be determined by the rotary adjustment, the area of the electrode points should be maintained as near constant as possible. Any increase in area will tend to reduce the heat per unit area, resulting in an improperly or poorly fused joint. A decrease in area will increase the unit heat and will usually burn a hole entirely or partly through the sheet to be welded, other factors remaining constant.

Importance of Current Flow

In addition to these variables, the time of current flow is of great importance. Too long a period gives the same result as too much heat. Too short a contact will produce no weld.

It has been found that spot welding depends on the following four variables:

1. Current (controlled by rotary switch).
2. Diameter of electrode contact points.
3. Pressure (controlled by spring or pneumatic pressure).
4. Length of time the current is allowed to flow.

While it would not be impossible to determine an adjustment of each of these with respect to the other for each gage to be welded, as in the case of automatic machines where time and pressure are accurately controlled by motor-driven cams, and the current set by hand, it would be next to impossible to determine same for manual operation, due to the personal element. Furthermore, such adjustment would be necessary for each individual machine. This makes it impossible to set up any specific procedure to follow for this class of work. However, stainless steel in general will require less heat than the same gage in common steel, due to its lower heat conductivity (tending to concentrate it in one spot), its lower melting point and better contact, due to a scale-free surface. Consequently, if an operator is producing good work on, say, 20-gage black steel, he could, in general, change to the same gage stainless by either dropping the switch one point or reducing the time slightly, or both. More definite instructions cannot be given, but the exact procedure must be worked out individually, balancing one variable against the other until the desired result is obtained.

Reducing the Depression

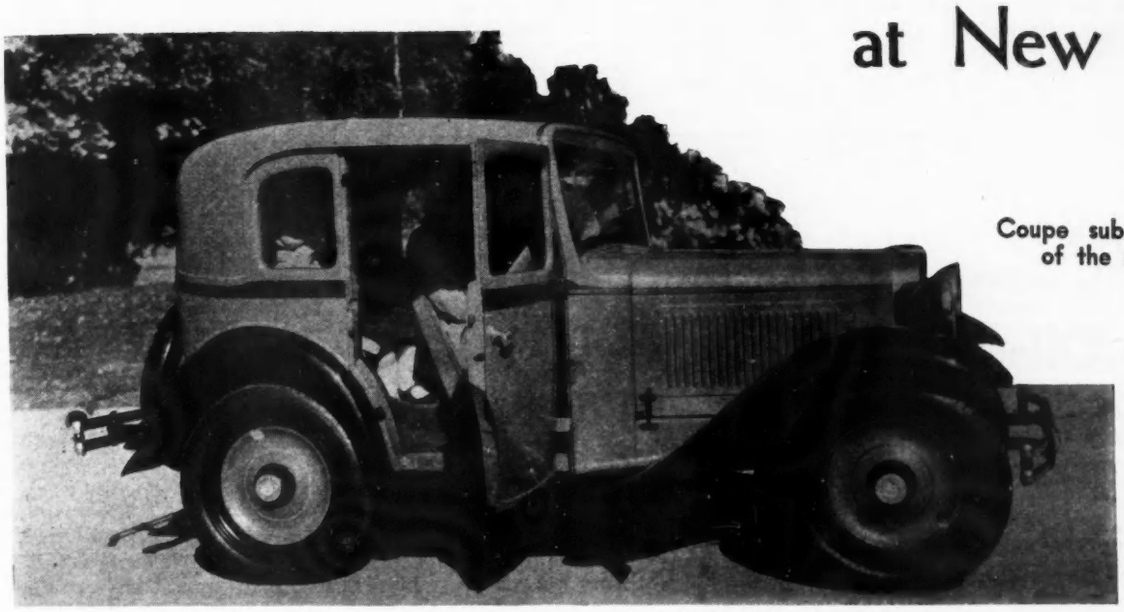
If both electrodes are of the same diameter a depression will occur on both sides which, while not serious on the pickle finishes, may be objectionable on the polished surfaces. This can be reduced by using a copper block about ½ in. thick and 2 in. square between the electrode and polished side, thus putting the major depression on the lower side. An aluminum block ⅛ to ¼ in. works even better, but, due to its lower melting point, will tend to pit if a slight arc is drawn. This procedure will reduce the depression, but will not eliminate it entirely, as it is due to shrinkage of the molten metal in the center, and hence pulls from both surfaces. The indentation remaining, if the work is to be polished, it will have to be ground out with a cotton wheel set up with glue and abrasive. (Use about 80 grit or finer.)

When welding polished stainless steel, it is advisable to place the welds at the least conspicuous positions, as often it is difficult to refinish the welds and have the same color if the whole piece is not refinished. This depends, however, to a great extent upon the finish of the sheets.

Spot welding, like any other type of welding requiring high temperature, will form an oxide on the surface which will be blue in color. If this is exposed to the weather or moist conditions, it will slowly change to a brown color resembling rust. This, however, is only a surface condition, affecting the original oxide only. If such welds are to be exposed to the atmosphere, they should be cleaned either with acid as in pickling in the case of No. 1 finished sheet, or ground and polished if No. 4 or higher finishes are employed. In the ground and polished state, spot welds are just as resistant to the salt spray as the original metal.

If welds are made in accordance with these instructions they will be free of intergranular corrosion so far as the salt spray or atmospheric conditions are concerned.

Austin Shows Four New Bodies at New York



Coupe suburban one of the models

NUMEROUS detail improvements have been made in the line of the American Austin Car Company of Butler, Pa., for 1933, and four new body types have been added—a coupe-suburban, a panel delivery, a special business coupe and a pick-up unit.

The new model is quieter than the previous one, owing to the use of rubber mounting for the engine, and to a new camshaft with modified opening and closing ramps. The timing gears now operate in a bath of oil, a plate having been provided on the forward side of the front main bearing which directs more of the oil into the timing-gear housing, and one of the holes through which the oil returns to the crankcase having been eliminated. The face of the camshaft gear has been widened, which helps to carry oil to the generator gear.

The engine supporting lugs have been provided with more generous fillets, to strengthen them, and the steering gear has been strengthened throughout, the tie rod now having greater wall thickness, the steering-gear case and cover being heavier, and the steering wheel having a more substantial steel reenforcement. The ratio of the steering gear has been changed from 6 1/3 to 1 to 9½ to 1, and the camber of the front axle has been decreased from 2¾ to 1¼ deg., for the sake of increased tire life.

The tread has been increased from 41½ to 42½ in. and the whole car is somewhat wider. An interesting mechanical improvement has been made in connection with the torque tube. On the bolts which fasten the torque tube ball housing in place, the nuts are provided with springs which automatically assure the proper adjustment of the housing to the ball.

Many of the accessories of the car have been improved, and a gasoline strainer has been added. A new type of radiator core with zigzag water passages is provided, which adds 15 per cent to the cooling surface and 2 lb. to the weight of copper in the core. On custom models the headlamps are mounted on the fenders, thereby eliminating the tie bar formerly employed and improving the appearance of the front of the car. The horn is larger and louder, there are new vertical louvers in the hood, and bumpers are now of the single-bar design.

Windshields are now slanting and on the closed cars they are higher and, therefore, give better vision. On the roadster the windshield is 1½ in. higher, for better vision, and the appearance of the roadster has been improved by a tumble-in top design. Both the upholstery and the body finish have been improved throughout the line and the upholstery in the coupe is now of mohair. Dash and floorboards are covered with felt for heat and noise insulation. Radiator shells are chromium-plated. The custom line is distinguished by special color treat-

Body insulation for sound, fumes and heat is one of the new refinements for Austin

ment and comes with special tires, dust shields, specially treated radiator shell and windshield frame, a special tire cover, as well as the bantam radiator cap.

The new panel delivery is similar to last year's model, but roomier and of improved appearance. The body framework has been strengthened and the driver's cab rendered more convenient. A drop bottom and wire-screen shelving can be provided with this model.

For bulkier but not too heavy loads the Austin Company offers the Bantam van, which also can be provided with wire shelving. Another new body this year is the Bantam pick-up, an open body suitable for miscellaneous loads.

Austin prices this year range from $275 to $405, f.o.b. Butler, Pa.

Chevrolet Commercial Line for 1933 Offered on Choice of Three Wheelbases

(Continued from page 75)

The new design of joint is of the spider type, with four hardened-steel cylindrical bearings. A flat machined on each of the trunnions provides for the entrances of lubricant. The hardened steel bushings are inserted from the sides and are retained by spring-steel snap rings.

Fuel tanks, which are located under the seats, now have increased capacity (15 gal.), and the ratio of the steering gear has been increased to 14 to 1.

In the short-wheelbase truck every dimension of the frame section has been increased, to permit of the elimination of reenforcement plates, the new maximum section being 6½ by 2⅜ by 3/16 in. Front cross members are designed for the new front-end mounting, which is the same as that on the 1933 passenger car.

Rounded edge leaves are found in the springs of the short-wheelbase truck to decrease wear, etc. On both trucks the rear spring pin is increased to ⅞ in. Front axle I-beams were strengthened during the 1932 season. Rear axles have been redesigned for greater strength, particularly at points of maximum stress. There is a new straddle-mounted drive pinion, and the torque tube is flanged. This involves a change in bearing sizes, the front pinion shaft bearing being larger and the rear smaller than formerly. Ring gears are larger in diameter. The differential is of the four-pinion type.

The torque tube is larger in diameter at the rear end, as is the propeller shaft. An optional axle ratio of 6.17 to one for construction work is available on the short-wheelbase truck. Front brake drums have been increased in diameter to 12 in. as on the light delivery and passenger car, and the lining for the front brakes is wider.

While standard wheel and tire equipment on the trucks remains unchanged, more options are available for varying conditions of service. All optional tires fit the 20 x 5 in. standard rims. Available at no additional cost are 6.00/20 in. 6-ply balloons, at extra cost 32 x 6 8-ply tires, 6.50/20 6-play balloons and 7.00/20 8-ply balloons may be had. With the 6.50 and 7.00 in. balloons, special spacers are provided between the dual rear wheels to prevent side-wall rubbing.

Front fender and radiator mounting is along the same lines as in the 1932 passenger cars, these units being mounted on a separate cross-member attached to the front cross-member by a flexible center mounting, to prevent transmission of frame distortion to these units. Front fenders are of heavier gage. Running boards are wider, hoods have central locking and lift handles. Headlamps are of new design. The radiator follows the 1932 passenger car line practice.

Shatterproof glass in windshield, new instrument boards, a stamped-steel front riser for the cab seat, a steel seat strainer, and a door trim panel are among improvements made in the cab.

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New Extraction Process

said to produce high-grade oils from non-paraffinic crudes

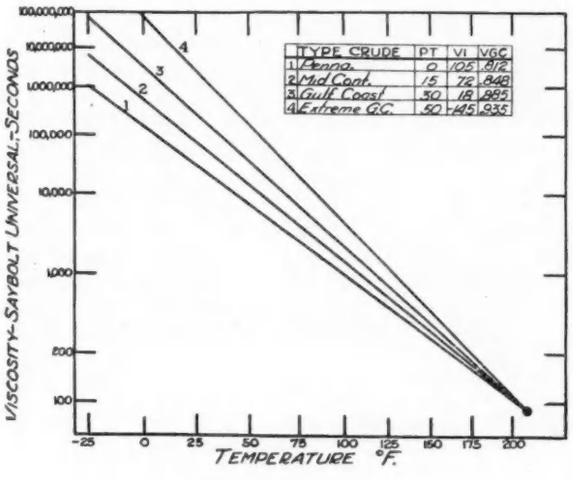
VISCOSITY-SAYBOLT UNIVERSAL-SECONDS
TEMPERATURE °F.
TYPE CRUDE | PT | VI | VGC
1 Penna. | 0 | 105 | .816
2 Mid Cont. | 15 | 72 | .848
3 Gulf Coast | 50 | 18 | .893
4 Extreme G.C. | 50 | -145 | .935

Fig. 1—Range of viscosity-temperature slopes for natural oils

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This feature of a low viscosity-temperature slope is characteristic of lubricants from crude oil of paraffin base, and the widely-held view regarding the superiority of lubricating oils from Pennsylvania crudes is no doubt based on the less rapid variation of their viscosity with changes in temperature. Another factor that has a bearing on the value of a cylinder oil is the relative amount of carbon deposited on the combustion-chamber walls. The tendency of an oil to liberate carbon under the effects of heat is generally judged by means of the Conradson test, but there is considerable disagreement as to the significance of this test.

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It is only a short time since the announcement of Essolube, a lubricant in which the original constituents of the crude oil are changed by the hydrogenating process. That is to say, additional hydrogen atoms are added to the hydrocarbon molecules of the oil to change their properties. Now the Atlantic Refining Company has introduced a process by which the compounds in the lubricating oil fraction of the crude oil which are less desirable from the standpoint of cylinder lubrication, are eliminated by means of solvents, while the most desirable compounds are retained. The process, known as the Nitrobenzene process for lubricating oils, was described in a paper by S. W. Ferris and W. F. Houghton of the Atlantic company at the recent annual meeting of the American Pe-

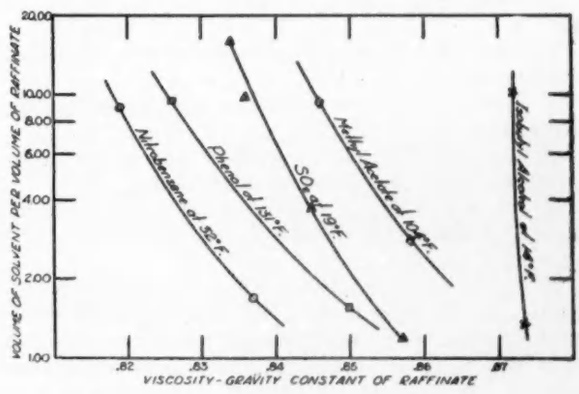
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Fig. 2—Over-all efficiency of various selective solvents

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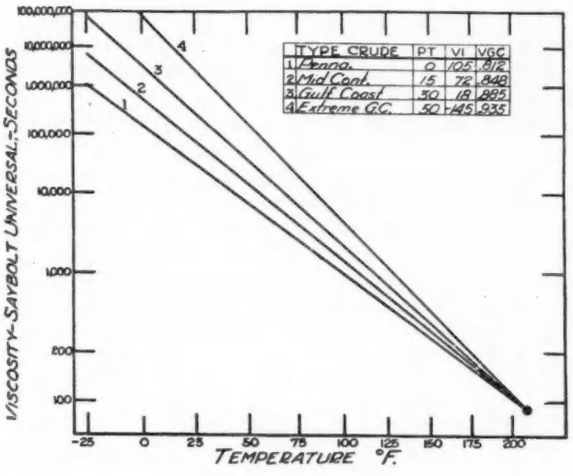
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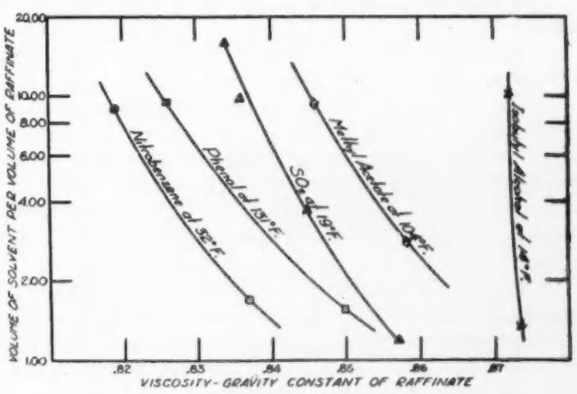
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Fig. 2—Over-all efficiency of various selective solvents

troleum Institute, and the following information on it is taken from this paper.

Fig. 1 shows the viscosity-temperature relationship for oils from crudes of different origins. Oils having a low viscosity-temperature coefficient are generally referred to as paraffinic, while those with a high viscosity-temperature coefficient are referred to as naphthenic. There are three possible methods of expressing the degree of paraffinicity.

One is based on the fact that for a given viscosity, paraffinic oils have a lower specific gravity than naphthenic oils. The specific gravities of natural lubricating oils vary from about 0.810 for Pennsylvania-crude oils to 0.940 for extreme Coastal types.

Use is made also of the "viscosity index" which furnishes a sort of inverted scale when compared with the viscosity-gravity constant, in that Pennsylvania oils show an index of about 100 while that of Coastal oils may be as low as minus 200.

Finally, there is the "parvis" temperature, which is the Fahrenheit temperature at which the oil in question exhibits the same viscosity as that exhibited at 0 deg. F. by a typical Pennsylvania oil whose viscosity at 210 deg. F. is identical with that of the oil in question.

Messrs. Ferris and Houghton state in their paper that although the correlation between the viscosity index and the "parvis" temperature on the one hand and the viscosity-gravity constant on the other, is not particularly close when considering a number of oils of radically different types, they found that whenever the viscosity-gravity relation is improved by selective extraction of a given stock, there is a corresponding improvement in the viscosity index and the parvis temperature. The table in Fig. 1 correlates roughly the three scales of paraffinity.

There are many substances with which mineral oils are miscible only to a limited extent; and, so far as is known, the naphthenic oils (or constituents of oils) are invariably more soluble than are the paraffinic oils. If then, one of these solvents be added to a lubricating stock in the proper proportions and at the proper temperature, two layers will be formed —one consisting of the major portion of the solvent, in which the more naphthenic constituents of the oil are dissolved, and the other of the undissolved oil, containing a relatively small amount of the solvent. If the two layers be separated, and the solvent removed from each, the undissolved portion (raffinate) will be found to be more paraffinic than the stock, by reason of the removal of the naphthenic constituents (extract).

The necessary qualities of the solvent may be listed as:

1. Non-reactive with stocks under the condition of the process.
2. Easily separable from the respective fractions, preferably by distillation.
3. Capable of effecting a sharp separation between paraffinic and naphthenic constituents.
4. Of such solvent power that a given separation may be made with reasonably small amounts of the solvent.

It is not necessary here to go into the tests conducted to determine which was the most efficient solvent. Suffice it to say that nitrobenzene was found to be the most satisfactory. In general, nitrobenzene may be applied to any petroleum stock which contains enough paraffinic material to produce a nitrofin layer and whose boiling range is sufficiently high to allow separation and recovery of the solvent. This statement is predicated on recovery by distillation. Other methods, such as removal by washing, crystallizing or salting out, would broaden the range of stocks somewhat. Nitrobenzene boils at about 410 deg. F., so that it is readily separable by distillation from substantially all lubricating stocks.

All save the least efficient of selective solvents remove a large portion of the color bodies with the naphthenic constituents; and, in general, the more efficient the separation between paraffins and naphthenes, the more effective the color removal. On this score also, nitrobenzene was found to be the best of those tested.

In its present state of development, however, the nitrobenzene process will not remove all the color. Reductions ranging from 65 per cent to 95 per cent are readily obtained; but beyond a certain point nitrobenzene is no longer effective in removing color, even though it is still capable of further increasing the paraffinicity of the oil.

By this method a highly paraffinic oil may be produced from the entire range of crudes, according to the authors, who summarize their paper by saying it has been demonstrated that a motor oil superior in every respect can be produced by nitrobenzene extraction at a reasonable cost; that this process insures flexibility with regard to crude source and viscosity of charge, and that exceptional oils for special purposes may be produced without modification of the plant.

1932 Stimulated Tool Design

(Continued from page 72)

Zinc is increasing in usefulness. Its use has become widespread in die casting for ornamental as well as structural parts of the car.

Stainless steel for machining purposes and rustless steel for bright parts is facing a bright future. An outstanding development in this direction is the introduction of Ingoclad, a two-ply metal consisting of a thin strip of rustless steel welded in rolling to a backing of ordinary carbon sheet. This promises to cut the cost of bright metal parts.

Rubber-replacing materials possessing the virtues of rubber without its usual limitations have made their appearance. One of these has been widely adopted because of its resistance to solvents, to aging, to flexing.

The past year saw some innovations in the field of body finishes It saw the auspicious advent of pearl essence in all its ramifications. It saw a greater interest in synthetic resin undercoating and finish. In fact one car maker had a synthetic finish in production for practically a year without saying anything about it.

Bismuth, a low melting point metal so useful in medicine, entered the production field aggressively. By varying the composition of a proprietary alloy, one company produces a line of alloys for use in setting pieces in complicated punches and dies; a filler material to aid in bending thin-walled tubing; another for sealing joints between copper tubing and glass.

And in the field of body finishing we recall the introduction of several types of undercoating that rustproof as well. One in particular, rustproofs through the medium of an active chemical inhibitor.

Obviously the retrospect is but a nibble, a very small sample of the course of development and research. Yet because of that very fact, it should convince those who may not have seen the whole picture, that research and progress have continued the unbeaten path.

Daimler-Benz Enters Diesel Aircraft Engine Field With 12-cyl. Vee Model

Fuel consumption is said to be 0.392 lb. per hp. hour at 1675 r.p.m. and output better than 700 hp.

THE Daimler-Benz Company in Untertuerlcheim, Germany, manufacturer of the well-known Mercedes-Benz automobiles, plans to announce shortly a new 750 hp. Diesel airfraft engine which has given exceptionally good performance on the test stand.

The engine, which is illustrated by the photographs reproduced here, has 12 cylinders in V arrangement. Its bore is 165 mm. (6.5 in.) and its stroke 210 mm. (8.3 in.). The piston displacement is 273.8 cu. in. per cylinder or 3286 cu. in. in all. Each cylinder has two inlet and two exhaust valves, which are actuated by two overhead camshafts, one for each row of cylinders. The fuel is injected into a precombustion chamber located between the four valves in the cylinder head, the design no doubt being similar to that of the well-known Mercedes-Benz Diesel for trucks and buses.

The Bosch injection system is used, consisting of two six-plunger fuel pumps, one for each row of cylinders, and 12 spring-loaded automatic nozzles. One pump block has an idling governor attached.

Ball and roller bearings are used throughout. The integral crankshaft is supported by split roller bearings between each pair of adjacent cranks. The valve rockers have "needle bearings" containing a great number of small-diameter rollers.

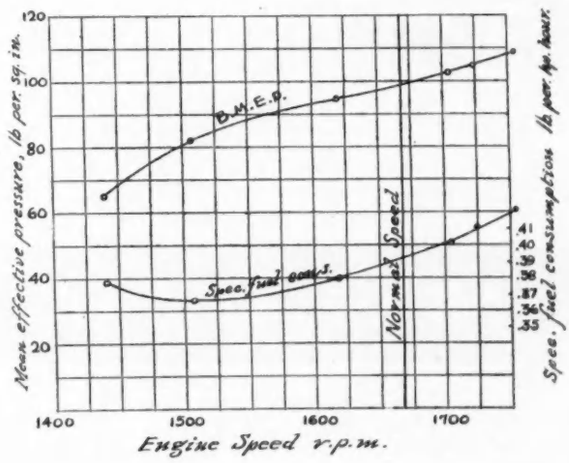
Pump circulation of cooling water and dry sump pressure lubrication are employed. Starting is by compressed air. To facilitate starting, each cylinder is provided with a glow plug.

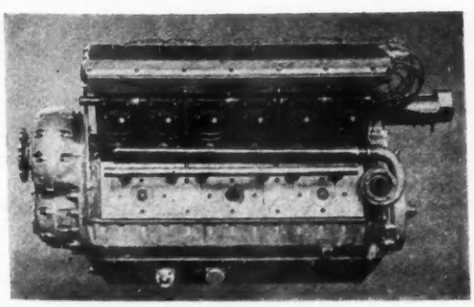
Double reduction spur gears are used to reduce the engine speed from 1700 to below 1000 r.p.m. propeller speed, the two reduction ratios being 1.5:1 and 1.2:1. The nominal output is 700 hp. at 1675 r.p.m. and the maximum 750 hp. at 1720 r.p.m.

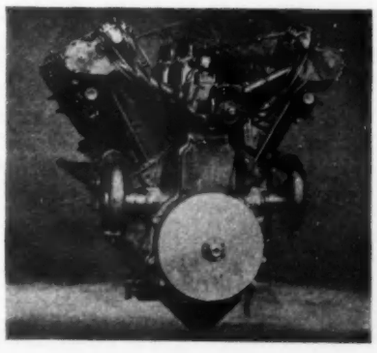
The weight of the engine, dry, inclusive of fuel pumps, 200-watt lighting generator, starting-air distributor with pipes and fittings, and reduction gearing, but without propeller hub, without air compressor for starting air and without air bottle, is 950 kg. (2090 lb.) which is equivalent to 2.78 lb. per horsepower on the basis of maximum output.

The results of a propeller test are shown in the diagram. The maximum b.m.e.p. was 108 lb. per sq. in., corresponding to 792 hp., but at this load a slight smoke was visible. At lower load the exhaust was clear. The specific fuel consumption was 0.392 lb. per hp. hour at nominal load, at 1675 r.p.m.; the minimum fuel consumption was 0.366 lb. per hp. hour at 1500 r.p.m. The fuel consumption curve is remarkably flat in the range tested.

The lubricating oil consumption was 0.022 lb. per hp. hour.







Above: Curves of b.m.e.p. and fuel consumption of Mercedes - Benz aircraft Diesel

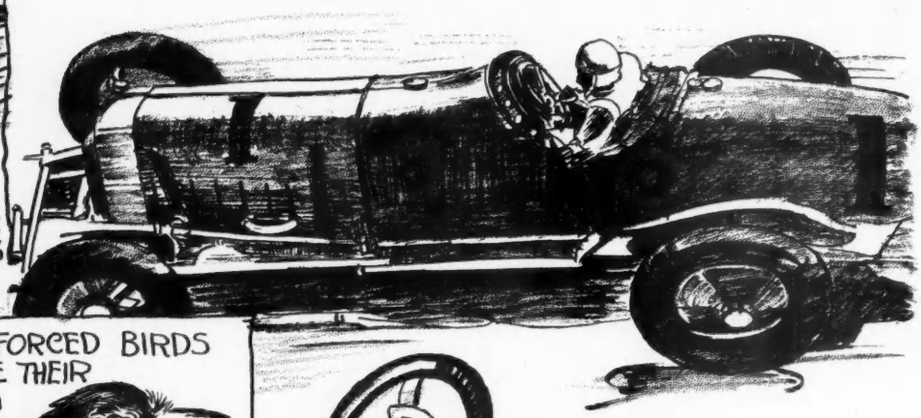
Left: Daimler-Benz 700 hp. 12-cylinder Diesel aircraft engine, side view

Right: Front view of Mercedes-Benz engine, showing generator, fuel pumps, camshaft drive gear, and starting-air distributors

Automotive Oddities—By Pete Keenan

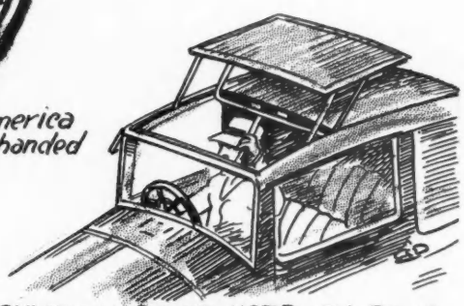
PAUL. L. CARPENTER OWNS THREE AIRPLANES. YET HE NEVER OWNED AN AUTOMOBILE. HE DOES NOT FEEL SAFE DRIVING ON THE GROUND.

PETER De PAOLO HAD FOUR SMASH-UPS IN HIS FIRST SIX STARTS AS A RACING DRIVER.



THE AUTOMOBILE HAS FORCED BIRDS TO USE STRING TO TIE THEIR NESTS TOGETHER INSTEAD OF HORSEHAIR.

All cars in America steered right handed until 1908.



THE SUNRAY ROOF USED ON SOME CARS IN ENGLAND.

Write us if you know an Oddity

The News Trailer

All rights and privileges, presumably the use of emphatic language, pertaining to the operation of a taxicab for hire were vested in women for the first tine in the history of Winnipeg when the council amended the by-law barring women from this calling.

An Austrian automotive division is about to be created in the Ministry of Commerce to deal with foreign and domestic sale and regulation of motor vehicles, as well as of rail-motor vehicle competition.

A $6,000,000 crop of tourists in 1932 was reported by New Brunswick, Canada. Average expenditures per car entering the province were $73.34, and the amount of gasoline tax paid by visiting motorists was more than double the entire appropriation expended by the province for publicity and advertising purposes.

First rumbles in the roar that becomes the Indianapolis 500-mi. automobile race May 30, was heard last week when seats went on sale for the longest advance offering in tickets in sports.

Stephen N. Balzer, Andover, N. J. built a car powered with a three-cylinder radial engine of his own design, and drove it in the latter part of September, 1894. Dr. Thomas F. Goodwin, then as now a physician in Mount Vernon, N. Y., bought and drove a Locomobile on July 27, 1899. Both were honored at the N.A.C.C. banquet during Show Week as "first to drive in New York City."

NEWS

1932 New Car Sales Reach 1,097,716

Polk Shows Cars Total 916,425, in Estimate Based on 21 States

DETROIT, Mich., Jan. 15.—New passenger car sales in 1932 totalled 1,097,716 units, according to an estimate announced today by R. L. Polk & Co., compilers of official automobile registrations throughout the United States. The estimate was founded on complete returns for the first 11 months and on estimated sales in December, based upon actual reports from 21 states.

The 1932 total was the lowest in the 11-year period covered by the Polk records. It compares with sales of 1,908,141 in 1931, 2,625,979 in 1930 and 3,880,247 in 1929.

New truck sales in the year were estimated to have totalled 181,291 units, as against sales of 313,884 in 1931.

New passenger car sales in December showed their usual seasonal upturn, the total for the month being estimated at 47,000, which compares with sales of 44,358 in November and 77,564 in December, 1931.

The 21 states reporting to date showed sales of 17,235 units. This total is 24.50 per cent greater than the 13,843 units reported in November but 42.55 per cent below the 30,002 units sold in the same states in December, 1931.

Truck sales for December also showed an increase over those for the preceding month, being estimated at 10,400 units.

The 21 reporting states showed sales of 3,395 units, which was 12.82 per cent above the 3,009 units sold in those states in November, but 24.34 per cent below the 4,487 units sold in the same states in December, 1931.

Eastern Canadian Show Jan. 21-28

MONTREAL, Jan. 10—Jan. 21 to 28 has been set for the National Motor Show of Eastern Canada for 1933, O. P. Messier, president of the Montreal Automobile Association, announced.

Thirty-five makes of automobiles will be on view, as well as a number of commercial vehicles and accessories will be shown.

To Protect B-O-P Sales Investments

Grant Sets Policy Against Overpacking Territories, So Dealers Can Make Profits

NEW YORK (*Special*)—Each B-O-P dealer must have enough sales potential to protect his investment, according to a statement made by Vice-president R. H. Grant at a luncheon given by the Buick-Olds-Pontiac Sales Co. for its dealers at the New York Show.

In explanation of this policy Mr. Grant said that it meant that B-O-P would not overpack any territory with dealers to the extent that the investments of existing dealers would be jeopardized.

Within the limits permitted by this basic policy, however, B-O-P wants to have as many retail outlets as it can get.

Mr. Grant said that he wanted a dealer organization that was sound financially as well as efficient in selling, believing that with such an organization satisfactory percentage of price class would be obtained. Consequently a strong and efficient dealer organization is the first among B-O-P's present objectives.

While steps are being taken to strengthen the fundamental financial position of the dealer organization, B-O-P is also getting under way on an educational program designed to raise the selling efficiency of dealers and their employees.

In cases where the equities of the various parties concerned did not permit consolidation within the General Motors family, Mr. Grant said that B-O-P would advise the addition of non-General Motors lines where the protection of the dealer's investment necessitated that course.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, Jan. 18—Several favorable features were noticed in general trade last week, and underlying conditions, without a doubt, are improving. The heavy industries were quiet.

The filibuster in the Senate promises to obstruct important legislation in this session of Congress, but business appears to have largely discounted any unfavorable influences along this line.

RAIL LOADINGS IMPROVE

Railway freight loadings during the week ended Jan. 7 showed some improvement. The total amounted to 435,652 cars, which marks an increase of 28,873 cars above that during the preceding week, but a decrease of 136,026 cars below that a year ago and a decrease of 277,476 cars below that two years ago.

N. Y. EMPLOYMENT DOWN

New York State factory employment showed a sharp seasonal decline during December. The decrease amounted to 3.1 per cent, as against a normal seasonal loss of less than 1 per cent. Total payrolls declined 3.6 per cent, although the normal tendency is for a moderate increase during that month.

BUSINESS FAILURES HIGH

According to R. G. Dun & Co., business failures during 1932 were the highest for any year since a record has been made. The total number of commercial failures was 31,822, as against 28,285 in 1931. Liabilities involved in the 1932 failures amounted to $928,312,517, as against $736,309,102 in 1931.

STORE SALES OFF

The Federal Reserve Board's preliminary adjusted index of the value of department store sales in December stood at 62, on the basis of the 1923-25 average as 100, as against 65 in November and 71 in October.

OIL PRODUCTION LOW

Average daily crude oil production for the week ended January 7 amounted to 1,777,450 barrels, as against 1,698,150 barrels for the preceding week and 2,234,200 barrels for a year ago.

FISHER'S INDEX LEVEL

Professor Fisher's index of wholesale commodity prices for the week ended Jan. 14 stood at 57.3, as against 57.4 the week before and 59.6 two weeks before.

BANK DEBITS DOWN

Bank debits to individual accounts outside of New York City during the week ended Jan. 11 were 20 per cent below those a year ago.

MARKET IS STRONGER

The stock market last week continued to develop strength. The rise in the prices of several commodities, especially wheat, was an important factor in the trend of the market. Trading was on a moderately large scale, and prices for the week were irregularly changed.

RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended Jan. 11 showed decreases of $3,000,000 in holdings of discounted bills and of $1,000,000 in holdings of bills bought in the open market.

The reserve ratio on Jan. 11 stood at 64.1 per cent, as against 63.0 per cent a week earlier and 62.7 per cent two weeks earlier.

Rohrbach Aircraft Has Paddle Wings

Unusual Design Said to Embody Great Safety and Simplifies Changing Pitch

PHILADELPHIA, Jan. 18.—News reports from Germany tell of a new type of flying machine which can hover in the air, ascend and descend vertically and fly forward and backward. Besides, it is said to be proof against stalling and spinning. It is the invention of Dr. Adolph Rohrbach, head of the Rohrbach Works, one of the leading German aircraft engineers whose experience covers a period extending back to 1914.

In place of the usual wings, the machine is fitted with three-bladed revolving wheels which are rotated by the engine. The basic principle is said to have been known for a long time.

These revolving wheels are reminiscent of the paddle wheels of river steamers. They revolve on an axle extending from the fuselage in both directions and which is as long as the wings ordinarily are. Rotation of the blades develops a lifting as well as a propelling force, and the ship is not provided with a screw propeller.

The reason the principle has never been applied until now is said to be that the mechanical difficulties involved in changing the pitch of the blades of the wheels from the cockpit seemed to be insurmountable. Rohrbach engineers are said to have worked on the problem for two years and to have arrived at a solution which has received the approval of the German Scientific Aeronautical Institute.

The pitch of the blades can be so adjusted that only a lifting effect is produced, and the machine can thus make a vertical ascent. If the pitch is then changed, a propelling effort can be produced in addition. Even a backward propelling force can be produced by a suitable change in pitch.

Owing to the fact that the lifting and propelling wheels rotate at a speed of 400 r.p.m., the centrifugal force on their members is great, and it is said to have been an extremely difficult task to develop a control mechanism for changing the pitch of the blades, that would be both sufficiently strong and sufficiently sensitive.

The Rohrbach mechanism appears to be of a balanced type, and the pilot needs to make only a slight effort to change the pitch.

A full-size model now under construction will have a span of 43 ft. and a length of 46 ft. It will probably be equipped with two Argus engines of 120 hp. each, and it is expected to be ready for trial next Summer.

World Automotive Facts—Feb. 25

The Fifteenth Annual Statistical Issue of *Automotive Industries* will appear February 25.

This valuable reference work will include statistical tables showing registrations, sales and production of U. S. and foreign cars and trucks, buses and aircraft, giving comparable data from the earliest years of the industry.

Data on production of vehicles by open and closed body styles, by retail price classes, percentages of passenger car production and data on production of parts are some of the important types of material which will be shown in this issue.

Detailed mechanical specifications of cars, buses, trucks and aircraft engines and a greatly augmented table of U. S. and foreign high-speed Diesel engine specifications will give engineers basic information on this increasingly important type of automotive powerplant.

Specifications on gearsets, rear axles, steering gears, front axles and clutches will further add to the value of the issue.

Japanese Shipping Tires Into Canada

KITCHENER, ONT., Jan. 16—A large Japanese rubber company has opened a factory in Singapore, Straits Settlements, and is shipping its goods into Canada at prices with which Canadian manufacturers cannot hope to compete. Representation will be made to the Federal Government at Ottawa to have these imports curtailed.

Willys Employment Up; Executive is Hopeful

TOLEDO, Jan. 18—Willys-Overland factory and offices here have 8233 workers on the payroll and John Willys, chairman of the Board, told a group of Toledoans in a public address last night that he hopes to build the payroll to 10,000 by March.

The plant is producing 250 to 300 units of the new Willys 77 now. Production on Willys 99 is scheduled to get underway in three to five weeks.

Willys said the 1933 Willys-Overland line is appealing to foreign buyers already.

"The only way we can win back our foreign trade is to make a high quality product and get the price down," he declared. "That's what we have done. This new Willys 77 is a good car for foreign business."

Engineers Hear Talks On Automotive Diesels

Philadelphia Group Told of Units by Butler and Morrison Development of High Speed

PHILADELPHIA, Jan. 18 — Two talks on Diesel engine subjects were given at a meeting of the Engineers Club of Philadelphia last night. W. H. Butler, of the Standard Oil Co., New Jersey, spoke on Fuels for Diesel Engines and L. H. Morrison, editor of *Diesel Power*, on The Development of the Automotive Diesel Engine.

Mr. Butler said the problem of fuels for Diesel engines presents rather different aspects according to whether heavy stationary or marine powerplants, or automotive engines are concerned. The stationary engine must compete with the steam engine and turbine, and this makes it necessary to so design it that it can operate satisfactorily on fuels which at most cost very little more than the fuel oil burned under boilers.

Automotive Diesels, on the other hand, must compete with the automotive gasoline engine and there are no such close limits with respect to the qualities of the fuels for which they may be designed.

Refiners, he said, can readily turn out a fuel that will give satisfactory results in practically any kind of Diesel engine, but this is a very small fraction of the crude and since it lends itself to being readily converted into gasoline, the price is relatively high.

Moreover, on account of this high price the oil is not widely distributed, and if it is to be used in some out-of-the-way place, the owner of the engine must provide sufficient storage capacity to enable him to take a tank-car lot at a time. On the other hand, there is a fuel oil which is very widely distributed and which sells at a minimum price, and it would be of great advantage to the Diesel engine industry if all engines could be designed to burn a fuel of this type.

Mr. Morrison traced the history of the Diesel engine from its beginning, illustrating the various types that were developed successively by means of lantern slides, and wound up his talk by describing the various types of combustion chambers used in automotive or high-speed Diesels.

He thought that the increase in taxation which threatened truck and bus operators as a result of the agitation of the railroads, would compel these operators to look for compensating economies, and that this would lead them to turn to the Diesel engine.

Judge Backs Trucks

ATLANTA, GA., Jan. 18—Superior Court Judge Edgar E. Pomeroy has ruled in effect that out of state motor freight trucks, operating on irregular schedules into Georgia, do not have to carry Georgia license plates.

Carey Wins A. A. A. 1932 Championship

Wins 815 Points, Fred Frame Trails With 710; Suspensions Are Announced

WASHINGTON, Jan. 18 — Bob Carey, Anderson, Ind., a comparative newcomer to official racing, has been awarded the A.A.A. championship for 1932.

Carey piled up 815 championship points and displaced Fred Frame, winner of the Indianapolis Classic, who ranked second, by a spectacular win in the final race of the year at Oakland, Calif.

Runners-up were: Fred Frame, 710 points; Howdy Wilcox, youngest of the leading drivers, 610 points; Russell Snowberger, 440; William Cummings, 430.

The A.A.A. Contest Board also announced the suspensions of the veteran Ralph DePalma for participation in unsanctioned record attempts, and B. Ward Beam of Chicago and Toledo, and Joseph B. Smith of Cleveland, racing promoters. Beam and Smith, the latter a former Contest Board official, were suspended for handling unsanctioned events and failing to adhere to A.A.A. standards.

Summarizing the events in the world of speed during the year just closed, the Board said that in addition to the close race for the championship, the twelve months were featured by many developments that served to give racing a new foothold.

"Outstanding among these was, of course, the new world land speed record established at Daytona Beach, Fla., by Sir Malcolm Campbell, who attained a speed of 253.968 miles an hour—an increase of 7.878 miles over his mark of 1931.

Suggests License Repeal, Substituting Gas Tax

DETROIT, Jan. 18—The American Road Builders Association at their highway transportation session here today, passed a resolution advocating the repeal of license tax for motor vehicles and substitution therefor a state gasoline tax.

The resolution recommended uniformity of gasoline taxes among states and suggested a flat registration fee for all vehicle types to extend for the life of the car or truck.

Ford Opens St. Paul Sales-Service Place

ST. PAUL, MINN., Jan. 16—The Ford Motor Co. today opened a sales and service establishment here. It will supplement the work of six authorized Ford dealers in the city.

Vane Resigns As N.A.D.A. Manager

C. A. VANE

After serving as general manager of the National Automobile Dealers Association for more than 11 years, C. A. Vane tendered his resignation to the board of directors during Show week.

Mr. Vane was counsel for the association prior to his tenure as manager.

He plans to move from Chicago to California where he will practice law. His resignation was contained in a book he had written, tersely discussing some of the industry's leaders and commenting upon policies and practices of automotive concerns.

New White Bus Makes Test Run

PHILADELPHIA, Jan. 17—One of the first of the new White 225-hp. city buses to come through the shops was demonstrated here last week to a group of transportation officials and trade-paper men.

It arrived here by way of Pittsburgh and was scheduled to go from here to New York and Boston and thence to return to Cleveland by way of Albany and Buffalo.

The bus is rather remarkable for its accelerating power. Its weight empty is in the neighborhood of 19,000 lb. The driving wheels carry 9.75/24 tires and the rear axle ratio is 5.58 to 1. Much of the acceleration is done in third speed however, which gives a total ratio of 9.15 to 1.

Owing to the use of a fully balanced 12-cylinder engine and rubber-mounting of the powerplant, practically no engine vibration is noticeable within the bus.

The machine steers with extreme ease, being provided with a power-steering gear.

Small Gains Show In Steel Output

Automotive Demand Continues As Dominant Factor, as 1/4 of Production Goes for Cars

NEW YORK, Jan. 19.—Small but steady gains continue to be made in the operating rate of the steel industry as a whole.

There is still much disparity between activities in the different districts and still more so between those of individual mills.

Automotive demand continues to be the market's dominant factor with more than one-fourth of all steel made going into automotive consumption.

The amount of attention for which out-and-out price cuts and concessions from supposedly minimum prices on sheets are coming in is rather a healthy sign.

It indicates that there is considerable buying and negotiating for sheet supplies by automobile manufacturers and parts makers. From the steel producers' point of view the plasticity of prices for sheets is, of course, deplorable, but makers of other descriptions of finished steel envy sheet and strip rollers for the automotive business which the latter enjoy, even though it entails price concessions.

In a good many other descriptions of steel products prices are characterized as rigid, but there is no business at these rigid prices. Chicago sheet specialists have intimated to the trade that they will protect what they consider as their tributary territory by meeting all price cuts of Eastern rollers.

Light cold rolled sheets are nominally quoted at 2.40c, Pittsburgh. There has also been considerable price-cutting of late in plates and shapes and while steel bars have held fairly steady, the fact that the latter are classified with the former as heavy rolled products, is giving producers some cause for apprehension.

Pig Iron—A fairly steady tone prevails in most of the markets. Single carload orders still predominate.

Aluminum—Quiet and unchanged.

Copper—Following moderate buying by European interests, the market relapsed into dullness, domestic consumers being apathetic. The quotation for spot metal remains unchanged at 5c, delivered Connecticut Valley.

Tin—The market opened on Monday a shade easier with spot Straits quoted at 22¾c.

Lead—Steady and unchanged.

Zinc—Easy and quiet.

Motor Tax Funds Should Be Used to Build Roads

DETROIT, Jan. 18—Diversion of motor tax funds seriously threatens to retard road building as well as automobile usage and is a subject for concern on the part of the public, according to B. E. Hutchinson, chairman, Plymouth Motor Corp.

India Tire Shows Operating Profit

Excise Taxes and Write-Offs Result in Net Loss of $96,332 in 1932

AKRON, Jan. 17—India Tire & Rubber Co. showed an operating profit of $296,834 for 1932, but a net loss of $96,322 after federal excise taxes, inventory losses and depreciations, President W. G. Klauss reported.

Payment of $33,203 federal excise taxes in the last three months of the fiscal year; allowance of $70,000 for depreciations, and writing down raw materials and finished goods to current market levels figured in the net loss.

India has paid off all direct bank borrowings and at the close of the year had a ratio of 3.7 to one in current assets, Klauss told stockholders at the annual meeting.

Mr. Klauss, who was reelected with all other officers of the company at the meeting, announced introduction of a new line of India tires.

Davis Heads Rubber Group

F. B. Davis, Jr., president, United State Rubber Co., was elected president of the Rubber Manufacturers Association, succeeding J. D. Tew, president, B. F. Goodrich Co.

W. H. Lalley, president, Kelly-Springfield Tire Co., was elected first vice-president, and George B. Dryden, president, Dryden Rubber Co., was elected second vice-president.

R. H. Goebel was elected secretary, H. B. Delapierre reelected treasurer and W. H. Blackwell reelected as assistant treasurer.

The executive committee for 1933 includes F. B. Davis, Jr., W. H. Lalley, George B. Dryden, C. Slusser, A. F. Townsend and J. D. Tew.

A. L. Viles, general manager for many years, continues in that ca pacity.

T. W. Miller, president of the Faultless Rubber Co., was elected a member of the board to fill the unexpired term of E. H. Broadwell, resigned. Other directors are:

George B. Dryden, E. B. Germain, A. B. Newhall, William O'Neil, J. D. Tew, E. S. Boyer, Herbert E. Smith, C. Slusser, W. S. Wolfe, F. B. Davis, Jr., C. D. Garretson, J. A. Lambert, A. F. Townsend and W. H. Lalley.

Hudson Names Blackman To Handle Advertising

DETROIT, Jan. 16—Hudson Motor Car Co. has selected the Blackman Co., New York advertising agency, to handle its advertising.

The company has established a Detroit branch office to facilitate production, and George Johnston, formerly with the factory sales department of Hudson, is manager.

Mark Wiseman resigned his partnership in the Blackman Co. to join Hudson as general director of advertising.

W. A. James remains as assistant sales manager in charge of advertising for Hudson, and J. Edward Schipper will conduct publicity for Hudson.

Hudson-Essex of Canada, Ltd., advertising will continue to be handled through the Ronalds Advertising Co., Montreal and Toronto.

December Use of Rubber Shows 23% Drop

NEW YORK, Jan. 17—Consumption of crude rubber by manufacturers in the United States for December, 1932, amounted to 16,990 long tons. This compares with 21,910 long tons for November, 1932, and represents a decrease of 22.5 per cent according to the Rubber Manufacturers Association.

Consumption for December, 1931, was reported to be 21,409 long tons. Consumption for 1932 amounted to 313,122 long tons as compared with 348,986 long tons in 1931.

Imports of crude rubber for December, 1932, were 28,567 long tons, an increase of 5.5 per cent above November, 1932, although 45 per cent below December, 1931.

Total domestic stocks of crude rubber on hand Dec. 31 were 388,229 long tons, which compares with Nov. 30 stocks of 377,996 long tons. December stocks showed an increase of 2.7 per cent as compared with November of this year, and 20.3 per cent above the stocks of Dec. 31, 1931.

The participants in the compilation, report 38,360 long tons of crude rubber afloat for the United States ports on Dec. 31, compared with 40,879 long tons afloat on Nov. 30, 1932, and 40,455 long tons afloat on Dec. 31, 1931.

Raleigh to Use Buses Instead of Trolleys

RALEIGH, N. C., Jan. 16—Buses will replace street cars here at an early date, it is announced by Mayor G. A. Isley.

Exports, Imports and Reimports of the Automotive Industry For November and Eleven Months Ended November, 1932-1931

	Month of November				Eleven Months Ended November			
	1932		1931		1932		1931	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories	....	$4,371,364	....	$5,617,108	....	$71,155,668	....	$138,768,233
Motor trucks, buses and chassis (total)	1,349	785,371	1,184	686,289	32,839	10,602,539	44,915	23,566,247
Under one ton	27	8,751	114	37,616	2,061	558,374	6,239	2,141,301
One and up to 1½	1,050	517,753	869	405,772	17,980	7,236,178	33,438	14,596,849
Over 1½ tons to 2½ tons	210	177,721	136	140,591	1,868	1,545,365	3,463	3,999,874
Over 2½ tons	54	78,206	38	79,939	695	1,191,671	1,289	2,308,488
PASSENGER CARS								
Passenger cars and chassis	1,763	984,719	1,928	1,218,938	38,685	22,253,494	76,704	47,345,839
Low price range $850 inclusive	1,572	809,175	1,559	837,953	33,015	15,888,254	60,982	29,671,531
Medium price range over $850 to $1,200	82	77,906	131	125,548	3,165	3,006,933	9,597	9,212,502
$1,200 to $2,000	34	46,308	73	99,220	1,192	1,572,137	2,699	3,876,196
Over $2,000	13	32,862	48	111,639	576	1,503,525	1,487	3,765,470
PARTS, ETC.								
Parts except engines and tires	....	1,155,450	....	1,928,581	....	19,746,971	....	37,959,602
Automobile unit assemblies	....	915,611	....	1,400,824	....	11,977,054	....	24,085,180
Automobile parts for replacement (n.e.s.)	....	140,022	....	199,553	....	1,395,220	....	3,063,196
Automobile accessories	....	66,817	....	65,022	....	1,355,375	....	3,563,335
Automobile service appliances (n.e.s.)	44	906,058	7	75,750	241	3,023,227	129	1,771,160
Airplanes, seaplanes and other aircraft	....	468.906	....	100,563	....	1,366,316	....	1,526,970
Parts of airplanes, except engines and tires								
INTERNAL COMBUSTION ENGINES Stationary and Portable								
Diesel and Semi-Diesel	2	46,571	8	15,761	41	182,992	270	344,854
Other stationary and portable								
Not over 10 hp.	189	12.928	205	13,325	3,696	237,383	7,000	541,416
Over 10 hp.	41	14,592	267	120,299	656	321,026	4,307	2,133,613
Automobile engines for								
Motor trucks and buses	25	13,997	200	32,828	1,624	277,130	5,776	822,328
Passenger cars	1,335	102,907	534	62,643	19,941	1,536,626	18,406	1,458,494
Aircraft	974	173,408	30	143,426	2,133	1,078,249	273	1,280,673
Accessories and parts (carburetors)	....	68,958	....	118,863	....	1,107,213	....	2,015,717
IMPORTS								
Automobile and chassis (dutiable)	68	24,324	86	31,365	494	233,204	680	720,357
Other vehicles and parts for them (dutiable)	....	9,401	....	9,500	....	62,242	....	64,697

Canadian Automobile Show Opens with All-Dominion Showing of Cars

Despite Opportunity for British Manufacturers to Show, No English Vehicles Exhibited as Show Opens in Automotive Palace in Toronto

TORONTO, Jan. 14—The 1933 National Motor Show of Canada opened in the Automotive Palace here today under the auspices of the Canadian Automobile Chamber of Commerce, this being the second annual exhibition under the direction of the Chamber. D. R. Grossman, managing director of the Studebaker Corp. of Canada, Ltd., is president of the Canadian association.

It was an all-Canadian show, thus giving further evidence of the trend in international trading conditions in so far as the automobile industry is concerned. Not one automobile of United States origin without the advantage of a Canadian branch factory was in evidence at Toronto.

In other words, American automobile manufacturers who do not boast a Canadian company for assembly and distribution purposes were conspicuous by their absence. The full range of Canadian lines was on display, however, augmented by various trucks and accessory exhibits.

At the same time, the National Show of Canada was without British car representation despite the opportunity to British makers to enter the Canadian market through tariff concessions. Incidentally, there was no restriction as to exhibits.

The show was open to the world even though it was sponsored and controlled by the organization of Canadian automobile manufacturers. All but the Ford Motor Company of Canada, Ltd., are members and Ford had a variety of models on display.

Prominent among the industry's visitors was John N. Willys, president of the Willys-Overland Company, Toledo, who addressed a meeting of Willys-Overland dealers on Monday. Other manufacturers had dealer meetings and special trade functions during show week.

This all-Canadian show was enlivened by cabaret and other entertainment features, including a fashion show which was staged by the T. Eaton Company, Canada's largest department store.

Models more or less introduced for the first time included the General Motors group, Studebaker and allied lines, the Dominion Motors' family including the Reo, Frontenac, Rugby and Continental, Willys-Knight and Overland, Chrysler, Plymouth and De-Soto, Hupmobile, Lincoln, Hudson and Terraplane and the Graham.

Casings Shipments Show 5% Decline

NEW YORK, Jan. 17—Shipments of pneumatic casings for November, 1932, totaled 1,711,298 casings, a decrease of 4.9 per cent under October of that year, and 40.7 per cent below November, 1931, according to the Rubber Manufacturers Association.

Production of pneumatic casings for November, 1932, were 2,303,545 casings, a decrease of 10.3 per cent under October of that year, and 7.9 per cent below November, 1931.

Pneumatic casings in the hands of manufacturers Nov. 30, 1932, amounted to 7,454,443 units, an increase of 8.4 per cent above Oct. 31, 1932, stocks, but were 5.9 per cent under Nov. 30, 1931.

The actual figures follow:

PNEUMATIC CASINGS

	Shipments	Production	Inventory
Nov., '32 ..	1,711,298	2,303,545	7,454,443
Oct., '32 ..	1,799,136	2,568,641	6,875,980
Nov., '31 ..	2,887,464	2,500,788	7,919,034

Bowman Heads Federal Sales

J. F. Bowman has been appointed vice-president in charge of sales of the Federal Motor Truck Co., Detroit, by the company's president, M. L. Pulcher.

Mr. Bowman was general sales manager of Federal for a number of years. He was later identified with the Garford truck for five years. For eight years he was distributor for a line of passenger cars and trucks.

In returning to Federal, Mr. Bowman will resume relations with many of the same distributors he contacted when previously with this company.

Hughes is New Departure General Manager Now

President DeWitt Page of the New Departure Mfg. Co. with plants at Bristol and Meriden, Conn., announces the appointment of Frederick G. Hughes as general manager and vice-president of the company, effective Jan. 1.

The other officers of the company were reelected.

Previous to joining New Departure in April, 1911, Mr. Hughes was experimental engineer at the Bethlehem Steel Corp. and chief engineer at the Driggs-Seabury Corp., Sharon, Pa. Starting as production manager, he has risen rapidly to become chief engineer, assistant general manager and vice-president.

Mr. Hughes was graduated from Yale and during the war was advisory engineer to the quartermaster department and a member of the war service committee on bearings.

As chairman of the Ball Bearing Standardization Committee of the Society of Automotive Engineers he was instrumental in effecting much of the standardization now so important in automotive production.

He has also served as president of the American Society for Steel Treating and is a member of the American Society of Mechanical Engineers.

Kelly-Springfield Assets $15,171,932

NEW YORK, Jan. 16—Consolidated statement of Kelly-Springfield Tire Co. as of October 31, 1932, shows total assets of $15,171,932 and surplus of $2,636,025. Current assets, including $1,170,803 cash, amounted to $8,040,704 and current liabilities were $540,171.

The balance sheet as of Oct. 31, 1932 (after giving effect to the provisions of consolidation agreement dated Aug. 23, 1932) follows:

Assets: Plant, equipment, etc., after depreciation, $6,548,874; cash, $1,170,803; accounts and notes receivable, $3,854,918; inventories, $3,014,983; investments, at cost, $485,770; deferred charges, $96,584; total, $15,171,932.

Liabilities: $6 preference stock, represented by 51,837 no-par shares, $5,183,700; common stock, represented by 741,861 shares of $5 par value stock, $3,709,305; ten-year notes, $2,721,500; trade accounts payable, $182,269; balances due customers, $7,003; accrued taxes, wages, etc., $247,649; interest payable, $103,250; reserves, $381,230; surplus, $2,636,026; total $15,171,932.

Coonley Named Standards Head

Howard Coonley, president of the Walworth Co., New York, was elected president of the American Standards Association for 1933.

F. E. Moskovics, chairman, Marmon-Herrington Co., was elected vice-president of the Association. He was formerly vice-president of the Franklin Automobile Co. and president of the Stutz Motor Car Co., and has represented the Society of Automotive Engineers in national standardization.

F. N. Hara

Frederick North Hara, a director of Hayes Wheels and Forgings, Ltd., died Dec. 26 at Toronto.

Several years ago his company, the General Forging & Stampings, Ltd., was taken over by the Hayes Wheels and Forgings, Ltd., and Mr. Hara remained as a director.

Stearns to Promote Allen

Allen Electric & Equipment Co., Kalamazoo, has appointed Earl A. Stearns sales promotion manager.

November Output Shows Big Gain

59,556 Units Reported By Bureau of Census; Eleven Months Total 1,265,287

WASHINGTON, Jan. 16—Output of motor vehicles in the United States last November totaled 59,556 units, a gain of 10,854 over October, according to reports received from manufacturers by the Bureau of the Census.

The November production consisted of 47,293 passenger cars, as against 35,102; 12,024 trucks compared with 13,595 and 239 taxicabs compared with five.

The output in the first 11 months of 1932 totaled 1,265,287 motor vehicles as against 2,268,197 in the corresponding period of 1931, and consisted of 1,048,514 passenger cars as against 1,870,302; 215,945 trucks compared with 393,004 and 828 taxicabs as against 4891.

The Canadian output last November declined to 2204 motor vehicles from 2923 and consisted of 1669 passenger cars and 535 trucks.

In the first 11 months of 1932 the Canadian output totaled 49,157 as against 63,069 in the corresponding period of 1931.

December Output Gains 66% Over November

December Production stimated at 102,770 Units by N.A.C.C.; Years Total Put at 1,426,966

NEW YORK, Jan. 16—Production of cars and trucks in December increased 66 per cent over the preceding month, according to the preliminary estimate released today by the National Automobile Chamber of Commerce.

The estimate placed the industry's output for December at 102,770 units, which made the output for the year 1,426,966.

12 Chassis Lubrications Given With B-O-P Cars

NEW YORK (*Special*)—A book of 12 coupons, each covering a free chassis lubrication, is being delivered with each new Buick, Oldsmobile and Pontiac car.

These coupons are good for a lubrication job at the service station any dealer in the country handling the particular make of car—that is for example, Buick coupons are good at any Buick dealers but not at the service station of a Pontiac or Oldsmobile dealer who does not handle the Buick line.

The dealer receives a cash credit for each coupon turned into B-O-P, the credit more than covering the reasonable cost of the lubrication job.

Champion of Canada General Manager

Charles Anson Spears

Appointment of Charles Anson Speers as general manager of the Champion Spark Plug Co. of Canada, Ltd., has been announced. Mr. Speers, who since 1925 has spent most of his time in the orient as foreign traveling representative for Champion, succeeds the late A. J. Hayes.

He is expected to sail for home from New Zealand, via Vancouver and is due to reach that port Feb. 24. He will take up active duties in Windsor at the Champion Spark Plug Co. of Canada, Ltd., immediately.

Automotive Employment In Michigan is Down

DETROIT, Jan. 17—Employment in the automotive industry in Michigan during December totaled 127,505, compared with 162,929 in December, 1931, and 113,918 in November. These figures are based on reports of 73 companies and compiled by the Dept. of Labor and Industry, Lansing, Mich.

Aggregate weekly payroll was $2,644,197 in December, against $2,486,458 in November and $4,183,458 in December the previous year.

Average weekly earnings per capita were $20.74 in December, $21.83 in November and $25.68 in December, 1931.

Ramsey Promoted By Ex-Cell-O

Earl L. Ramsey, who has been in the general sale office of Ex-Cell-O Aircraft & Tool Corp., since September, will be production engineer working with the sales representatives in the different territories, effective Feb. 1.

Mr. Ramsey joined the sales force as production engineer, Jan. 1, 1931, prior to which he was Buffalo branch manager for the Wm. G. Harvey Co. of Syracuse, N. Y., handling Ex-Cell-O products and other associated lines.

20 Governors Hit Motor Vehicles

Use of Gasoline Tax for Relief, etc., and Further Limitations on Weights are Recommended

WASHINGTON, Jan. 20 — Propaganda intended to place upon motor transportation heavier burdens of taxation and regulation has resulted in specific recommendations by the governors of some 20 states to the members of their legislatures.

Rhode Island's governor recommends transfer of gasoline taxes from state roads for unemployment relief.

The governor of North Carolina recommends diversion of $2,000,000 annually for two years.

North Dakota's governor suggests that the one cent gasoline tax be used for poor relief.

Among those advocating more drastic regulation of the commercial motor vehicle are the governors of Vermont, Colorado, Illinois, Minnesota, South Dakota and Pennsylvania.

Governor Floyd B. Olson, Minnesota, advocates a "substantial" increase in the license tax upon common carrier and contract trucks and buses.

Governor Lewis J. Brann, Maine, suggested that the legislature consider the advisability of an excise tax upon bus lines and large trucks.

Governor Gifford Pinchot, Pennsylvania, who recently endeavored to enlist the support of all state governors for his plan to place a limitation upon trucks, lower than that recommended by the American Association of State Highway Officials, specifically urged upon the legislators the advisability of far more drastic regulations for commercial motor vehicles than are now provided. In his message he said, "railroads pay for their rights of way, for construction, for ties and rails, and they pay interest on their investment and taxes on their property. The trucks use roadbeds wholly at public expense.

"It is not good public policy to let the trucks ruin the railroads and injure investors in railroad securities," he declared.

Governor Wilson, of Vermont, advocated further regulation of heavy trucks, "especially those from other states." He suggested an adjustment of registration fees on the basis of weight.

Governor Adams, Colorado, advocated the regulation of buses and trucks so as to control sizes and weights.

Governor Harry Horner, Illinois, recommended laws empowering the Illinois Commerce Commission to regulate the trucking and motor transportation industry of that state, declaring that motor truck operators should be required to pay "a just and reasonable charge for the use of the roads and thus increase our state revenues."

"Re-Engineering" Group Planned for March 22

CLEVELAND, Jan. 18—Case School of Applied Science will be host for a conference on "Re-Engineering for Economical Manufacture" on March 22, 23 and 24, the eighth sponsored jointly by Case and the Cleveland Engineering Society, together with representatives of national engineering societies. Prof. E. S. Ault, associate professor of mechanical engineering, is general chairman.

To Advertise Goodrich

AKRON, Jan. 16—Advertising for the tire division of the B. F. Goodrich Co. will be done by Ruthrauff & Ryan, Inc., New York and Chicago, it was announced this week by P. C. Handerson, Goodrich advertising director.

British Approve U. S. Engine

MONTREAL, Jan. 16—The first airworthiness certificate issued by the British Air Ministry for an aircraft engine of American design was recently granted to Canadian-Wright, Ltd., here, agents in the British Empire for the Wright Aeronautical Corp., approving the nine-cylinder Whirlwind model for a rating of 300 hp. at 2000 r.p.m.

Goodyear Southern Rubber Plant is Busier

BIRMINGHAM, ALA., Jan. 16—The Goodyear Tire & Rubber Co. announced that the Gadsden, Ala., plant, effective Jan. 3, began operations on a five-day schedule of three shifts.

The plant had been operating on a three-day-a-week schedule, and the upturn in demand for tires prompted the increased schedule of operations.

Hupp Reports Loss

DETROIT—Hupp Motor Car Corp. has reported net loss of $3,405,190 after all charges, for the first nine months of this year, compared with net loss of $1,973,294 during the same period of last year.

MacMorris Joins Norma-Hoffmann

Norma-Hoffmann Bearings Corp., Stamford, Conn., has been making ready with extensive additions to its line of "Precision" ball, roller and thrust bearings. John W. MacMorris has been engaged as factory manager, and assumed his new duties on Dec. 15. He brings to his new position many years of production experience, including nine years as factory manager for S.K.F. Industries, Hartford Plant.

Austin Orders Increase With 1933 Showings

BUTLER, PA., Jan. 16—Orders on hand for immediate delivery of American Austin cars from the factory now total 546.

The 1933 Austin (see description, page 77, this issue) is now being produced at the rate of approximately 1000 cars per month, according to W. H. Weingar, general sales manager.

Tentative Program, S.A.E. Annual Meeting, Detroit

MONDAY, JAN. 23

10:00 A. M.—Transportation and Maintenance
A. S. McArthur, Chairman
Legislation Affecting Motor Vehicle Transportation
T. R. Dahl, The White Co.

2:00 P. M.—Motorcoaches and Motor Trucks
B. B. Bachman, Chairman
Rubber-Tired Rail Coaches
Col. E. J. W. Ragsdale, Edw. G. Budd Mfg. Co.

2:00—Trip and Demonstration
A visit to the University of Detroit Aeronautic Laboratory

8:00 P. M.—Student Session
H. T. Woolson, Chairman
Sixty Octaves of Radiant Energy
Dr. H. C. Rentschler, Westinghouse Lamp Co.
The Automobile's Place in American Transportation
B. E. Hutchinson, Chrysler Corp.

TUESDAY, JAN. 24

10:00 A. M.—Diesel Session
A. J. Poole, Chairman
Testing with the Farnboro Electric Indicator
E. T. Vincent, Continental Aircraft Engine Co.
Fuels for High-Speed Oil Engines
Max Hofmann, Waukesha Motor Co.

2:00 P. M.—Aircraft Engines
P. B. Taylor, Chairman
Indirect Air Cooling of Aviation Engines
J. H. Geisse, Consulting Engineer, Madison, Wisconsin.
Flight Test Equipment and Methods
A. L. MacClain, Pratt & Whitney Aircraft Co., and D. S. Hersey, United Aircraft & Transport Corp.
Recently Developed Flight Test Methods
F. M. Thomas and H. W. Fairchild, United Aircraft & Transport Corp.
Propellers
F. W. Caldwell, Hamilton Standard Propeller Co., and F. M. Thomas, United Aircraft & Transport Corp.

8:00 P. M.—Business Session
President A. J. Scaife in the Chair
Nomination and Election of Members-at-Large of Annual Nominating Committee
Announcement of Election of Officers for 1933.
A Philosophy of Economics
President-Elect H. C. Dickinson

9:00 P. M.—Aircraft Session
W. B. Stout, Chairman
Air Transportation Systems of the United States
Col. C. M. Young, Asst. Sec'y of Commerce

WEDNESDAY, JAN. 25

10:00 A. M.—Body Session
R. F. Anderson, Chairman
Cushion Springs and Riding Comfort
F. R. Atkinson, Atkinson Spring Co.
Results Gained from Foreign Designs
Amos Northup, Murray Corp.

10:00 A. M.—Passenger Cars
Alex Taub, Chairman
Pertinent Pokes for Satisfied Engineers
Herbert Chase, Consulting Engineer, N. Y.
Aluminum Cylinder Heads
F. F. Kishline, Graham-Paige Motors Corp.

2:00 P. M.—Streamlining Session
W. C. Keys, Chairman
What Price Standardization?
W. T. Fishleigh, Consulting Engineer, Detroit
The Air Resistance of Motor Vehicles
W. E. Lay, University of Michigan; Charles D. Holton and Robert B. Patterson.

8:00 P. M.—Chassis Session
P. L. Tenney, Chairman
The Future of Low-Pressure Balloon Tires
A. F. Denham, *Automotive Industries*
Automatic Transmissions
W. C. Keys, Consulting Engineer, Detroit
The New A-B-C in Clutch Design
E. E. Wemp, Long Manufacturing Co.

THURSDAY, JAN. 26

10:00 A. M.—Riding Qualities
R. W. Brown, Chairman
Final Report on Riding Qualities
Dr. F. A. Moss, The George Washington University
Inertia Control Shock Absorbers
Carl Kindl, Delco Products Corp.

12:00 Noon—Production Luncheon
R. A. Vail Chairman
Production a Human Equation
K. T. Keller, Chrysler Corp.

2:00 P. M.—Production Session
V. P. Rumely, Chairman
Some Principles of Flexible, Accurate, Low-Cost Tooling
J. E. Padgett, Spicer Manufacturing Corp.
Automotive Aspects of Work of the Committee on Rehabilitation of Industry
Col. James L. Walsh, Guardian Detroit Union Co.

2:00 P. M.—Fuels and Lubricants
J. B. Macauley, Chairman
The Vapor Handling Capacity of Automobile Fuel Systems
O. C. Bridgeman, H. S. White and F. B. Gary, Bureau of Standards
Correlation of C.F.R. Laboratory Knock Ratings with Behavior of Motor Fuels in Service
C. B. Veal, S. A. E.; H. W. Best, Yale; J. M. Campbell, General Motors Research, and W. M. Holaday, Standard Oil Co. (Ind.)
The Load-Carrying Capacity of Extreme Pressure Lubricants
S. A. McKee, Bureau of Standards
Friction Data in the Region of Thin Film Lubrication
O. C. Bridgeman, Bureau of Standards

7:00 P. M.—Dinner
Detroit Section acting as host.

Tire Makers are Busier

Increased Schedules Reported By Major Manufacturers In Akron Rubber Area

AKRON, Jan. 16—Increased activities in the tire divisions of the larger Akron rubber companies were reported here last week.

Goodyear Tire & Rubber Co. factories, which were on a three day week during a large part of 1932, have gone on a four day week in the tire divisions, operating four shifts of six hours each a day.

B. F. Goodrich Co. officials say a four day week is now the minimum in the tire divisions and that some other parts of the plant are on heavier schedules.

Firestone Tire & Rubber Co. officials say they have been calling more men back to work for some time and spreading out the work rather than increasing hours of work. The Firestone company is also on the six-hour day.

Contract for supplying solid tires for the fleet of trucks used by West Virginia's road commission has been awarded to the Firestone company. It was reported here the contract will involve more than $100,000 worth of tires. Contract for furnishing pneumatic casings and tubes to the West Virginia commission was awarded to the General Tire & Rubber Co. of Akron.

Aircraft and Aero Engines Exempt From Extra Duty

WASHINGTON, Jan. 16—Airplanes and airplane motors and spare parts are included in the list of products exempted from the provisional additional 10 per cent import duty which has been retained by Argentina, according to a cablegram received from Commercial Attache James S. Burke, Buenos Aires.

Issues Aero Engine Report for 1932

BERLIN (*Special*) — The Engine Section of the German Aeronautical Experimental Laboratory in Berlin-Adlershof has issued its annual report for 1932, by Dr. Ing. Oskar Kurtz.

In addition to a general report of the activities of the laboratory and another of the engine department, it contains papers on the following subjects: Frictional Losses in Aircraft Engines, by Kurt Loehner; Velocities of Flame Propagation in Gasoline-Benzol-Air Mixtures in High-Speed Spark-Ignition Engines, by Kurt Schnauffer; Practical Investigation of Torsonial Vibration in the Cranktrains of Aircraft Engines, by Karl Luerenbaum; Present-Day Design of Aircraft Engines and Its Relation to the Design of Automobile Engines, by Oskar Kurtz; Behavior of Different Fire Walls Constructions Under the Influence of Torch Flames, by Fritz Kuehn; New German-Aeronautical-Laboratory Instruments for the Measurement of Rotary Speeds, by Erich Kloss, and Maximum-Pressure Indicator for High-Speed Engines, by Egon Urbach.

M-G Shows Cars In Canadian Stores

TORONTO, Jan. 16—The first public move by a British automobile manufacturer to gain a place in the Canadian market under the free-entry privilege of imports was seen in the display of two M-G midget cars in the department stores of the T. Eaton Co., Ltd., here and at Montreal.

The exhibit was arranged by M-G. The presentation was for demonstration purposes only, and it was announced that Canadian agents would be appointed in six months' time.

Heads Empire Trade Section

W. E. Humphries, Canadian manager of Leyland Motors, Ltd., Toronto, has been elected chairman of the British Trade Section of the Toronto Board of Trade.

The purpose of this organization is to encourage business with the United Kingdom and to facilitate the exploitation of British products in the Dominion.

Wholesalers Report Sales 13% Lower

N. S. P. A. Questionnaire Shows Decrease From 1931 Totals of Members

DETROIT, Jan. 16—Sales of automotive wholesalers in the United States were 13 per cent less in dollar volume in 1932 than in 1931, a survey completed by the Marketing Research Department of the National Standard Parts Association shows.

Sales to independent repair shops constitute 60 per cent of the wholesalers' volume, with 18.3 per cent to car dealers, the balance being made up by sales to fleet owners, to the retail trade and to other miscellaneous classifications.

Wholesalers' inventories on the average, have decreased 5.26 per cent in the past year.

Twenty-nine per cent of wholesalers' requirements is supplied by manufacturers' warehouses.

The average unit of sale has decreased from $4.39 in 1931 to $3.66 in 1932.

The percentage of monthly collections as against total accounts receivable decreased from 59 per cent in 1931 to 56 per cent in 1932.

Mayo Reelected

William B. Mayo of Detroit was reelected chairman of the Michigan State Board of Aeronautics.

+ + CALENDAR OF COMING EVENTS + +

FOREIGN SHOWS

Berlin International .....Feb. 12-22

CONVENTIONS

Society of Automotive Engineers (Annual Meeting) Detroit..Jan. 23-26
American Soc. for Testing Materials (Annual Meeting) ..June 26-30

SHOWS

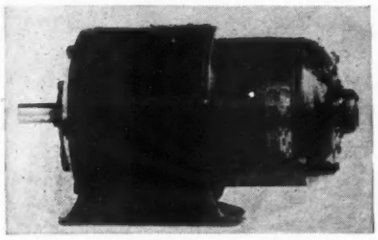
Motor Boat Show, Grand Central Palace, New York .....Jan. 20-28
Baltimore, Md., Automobile Show Jan. 21-28
Detroit, Mich., Automobile Show Jan. 21-28
Boston, Mass., Automobile Show Jan. 21-28
Hartford, Conn., Automobile Show Jan. 21-28
Pittsburgh, Pa., Automobile Show Jan. 23-28
Rochester, N. Y., Automobile Show .....Jan. 23-28
Windsor, Ontario, Automobile Show Jan. 25-28
Harrisburg, Penna., Automobile Show .....Jan. 25-28
Portland, Me., Automobile Show Jan. 28-Feb. 4
National Automobile Show, Chicago .....Jan. 28-Feb. 4
Washington, D. C., Automobile Show .....Jan. 28-Feb. 5
Springfield, Mass., Automobile Show .....Jan. 30-Feb. 4
Lnacaster, Pa., Automobile Show Feb. 1-4
Indianapolis, Ind., Automobile Show .....Feb. 4-11
Omaha, Neb., Automobile Show, Feb. 6-10
Denver, Colo., Automobile Show Feb. 6-11
Springfield, Ill., Automobile Show Feb. 9-11
Kansas City Automobile Show.Feb. 11-18
Toledo, Ohio, Automobile Show.Feb. 11-18
Rapid City, S. D., Automobile Show Feb. 14-18
Peoria, Ill., Automobile Show..Feb. 15-19
Wichita, Kans., Automobile Show Feb. 21-24
Holyoke, Mass., Automobile Show .....Feb. 22-25
Evansville, Ind., Automobile Show Feb. 24-26
Albany, N. Y., Automobile Show Feb. 25-Mar. 4
Seattle, Wash., Automobile Show .. Feb. 26-Mar. 4
Des Moines, Iowa, Automobile Show .....Feb. 27-Mar. 4

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Louis Allis Speed Reducers

Motorized Speed Reducers of high efficiency, capable of employing nearly any type of motor, have been placed on the market by The Louis Allis Co., Milwaukee, Wis. The motor and speed reducer are combined into a single, self-contained unit which makes an easily-mounted, slow-speed drive for many types of industrial machinery. Ratings available are ¾ to 75 hp. with output speeds 4 to 400 r.p.m.



Built - in styles accommodating nearly any type of motor, these units can be furnished with motor characteristics and style of mounting best suited to each application. The integral style shown in the attached photo, in which the endbell is removed and the motor close-coupled to the gear casing, is most common where an open motor or enclosed non-ventilated motor is employed. The flexible style, in which the entire motor without any change is mounted on the gear casing, is furnished where conditions require an explosion-proof, enclosed fan-cooled, splash-proof, or other protected type of motor.

Silverlink Roller Chain

An announcement comes from Link-Belt Company, Indianapolis, Ind., of a roller chain to be known by the trade name Link-Belt Silverlink. Although the chain is not made up with silver links, its side bars are especially treated to assist in resisting corrosion, and this treatment gives them the appearance of silver.

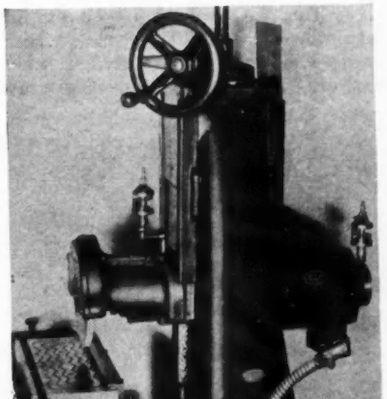
Silverlink Roller Chain is made in all sizes from ⅜" to 2½" pitch, and in single or multiple widths. It is available with wheels, for any horsepower, also with conveying attachment links in wide variety; and complete drives are carried in stock by distributors in sizes up to 225 hp., in speed ratios of 1 to 1 up to 8 to 1.

Ex-Cell-O Surface Grinding Spindles

Ex-Cell-O Aircraft & Tool Corporation, Detroit, Mich., announces two direct motor driven grinding spindles for Brown & Sharpe No. 2 Surface Grinders which are in addition to the present line of standard belt-driven spindles.

The illustration shows a heavy-duty, inbuilt motor-driven spindle with special holding bracket. Grinding spindle and motor are both mounted on a common shaft. Ex-Cell-O Precision Ball Bearings are used in the spindle and motor. The special bracket replaces the bracket furnished with the grinder. At the back of the bracket provision is made for pressing the motor field into place. The section housing the motor is heavily ribbed. Sufficient stock is left on the bracket to fit to the ways of the machine.

Another standard type of direct motor-driven spindle can be fitted into the regular Brown & Sharpe bracket by boring the bracket out to three



inches. Two holes are drilled and tapped in the bottom of the bracket for set screws to hold the spindle from turning. Two flats in the body of the spindle are provided on the bottom side of the body for the set screws.

The motors used on each type are the same as those used in the boring units of the Ex-Cell-O Precision Boring Machines.

New Line of Shafer Roller Bearings

A NEW line of single row self-aligning radial roller bearings is being offered by the Shafer Bearing Corp., Chicago, Ill. A single row concave bearing (of full roller type) is used, with rollers operating between a straight outer race and a convex inner race. This design assures liberal radial load capacity, with ample provision for the limited thrust capacity needed in applications having moder-

ate loads. Self-alignment is obtained in the bearing itself, thus compensating automatically for misalignment due to inaccuracies in machining or shaft deflection under load.

In addition to the pillow block, Shafer light duty bearings are available in flange units, hanger boxes and take-up units for shafts from 9/16" to 2-3/16" inclusive. All housings are compact yet sturdy, to meet the needs of light duty service. These units are complete, ready to install.

Prosser Patent Brazing Process

Thomas Prosser & Son, New York City, has announced a patented brazing process, known as the Z-Foil Process, for attaching cemented carbide tips of various kinds to steel shanks.

It is claimed that the new process produces a bond between the cemented carbide and the steel shank, several times stronger than that produced by the usual methods of copper brazing. It is stated that Widia Cemented Carbide Tools can be supplied for severe service brazed by the Z-Foil Process, with the guarantee that the tips will not come off or slip.

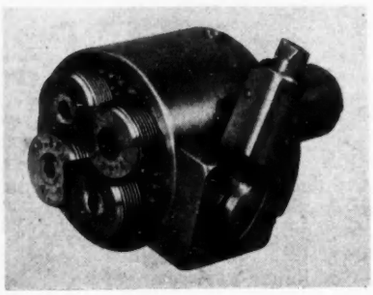
Another advantage obtained is that no dovetailing of the tip is necessary. Therefore, the extra charge for the unusable cemented carbide in dovetailed tools is eliminated. Tip cracking in service is minimized, as the Z-Foil bond is claimed to absorb stresses caused by the difference in coefficient of expansion between the Widia tip and the steel shank.

NEW DEVELOPMENTS
Automotive Parts, Accessories and Production Tools

National Acme Self-Opening Die

A self-opening die with circular chasers, type DBS, made to fit Brown & Sharpe automatics, is being introduced to the trade by The National Acme Company, Cleveland, Ohio.

While principally designed to give greater chaser life, the use of the circular forming tool principle is said to enable the operator to secure a superior thread profile and better thread finish due to the natural cutting clearances of the circular tool.



The large mass of metal behind the cutting edge permits maximum cutting speeds as the heat created in thread cutting is more readily diffused.

These chasers are reset and reground according to predetermined micrometer measurements in the tool room on chaser blocks that are used in the die head.

Adjustment for snug or loose fit can be made in just a few moments without removing the die, and the chasers and chaser blocks can be removed or replaced in the die in 30 seconds time.

Milburn Spray Gun

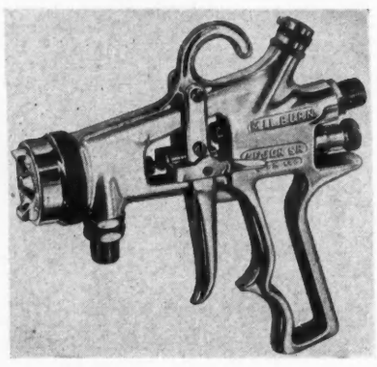
A PAINT spray gun with new features has been placed on the market by the Alexander Milburn Co. of Baltimore, Md. It is made in two types—Type M for large industrial and automotive work, and Type N for fine touch-up work and high-lighting.

The body of the gun is made of high-tensile aluminum alloy, and the passages in it for air and fluid are all straight drillings, without pluggings or by-passings. The handle is part of the forged body, and this simplification is said to reduce the weight by about 8 oz. Type M weighs about 1¼ lb. and Type N, ½ lb. The body of the gun forms a triangular frame which houses and protects the working parts.

The fluid nozzle and air atomizer head are of new design. The latter has a seat in its base which holds the hardened-steel nozzle rigidly in both the horizontal and vertical directions, thus assuring proper alignment of parts. The atomizer head is formed in one piece, and all drill holes are at right angles to joint surfaces. The holes pass straight through and there are no cross drillings, which facilitates cleaning. External holes of the atomizer head are countersunk, which prevents deflection of air currents and protects the surfaces of the holes.

The fluid, such as paint or lacquer, is controlled as to volume or density by means of an independent, removable unit needle valve made of stainless steel, adjacent to the operator's hand. Through the air valve control and the paint valve control, any width or shape spray or volume of material can be obtained. A latch releases the paint control so that the spray can be cut off while the operator is climbing ladders or scaffolds. It also allows the full air supply to be used for dusting.

The gun has large separate air passages for the central atomizing and flattening of air, all controlled by a single knob, the mere turn of which controls the initial air pressure and



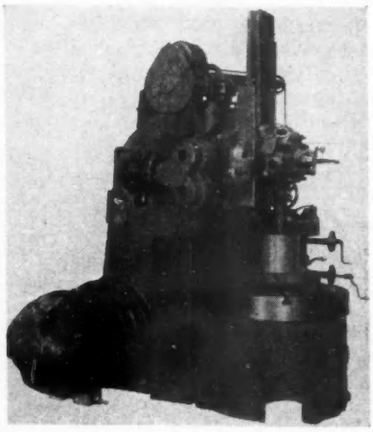
the air for both round or flat sprays. Means are provided for controlling the initial air pressure from its source without the necessity of an air regulator, and variations in the operation of the air compressor are said to be equalized.

All parts of the gums are made of metal. The air valves are of rustless steel and have ball seats. The threaded connections in the guns are interchangeable.

Bullard High-Speed Turret Lathes

Completely motorized adaptation of Bullard Vertical Turret Lathes now fits them primarily for high-speed work. It provides for the full advantages in the use of metalloid cutting tools, and in the case of the 42" machine, for example, it is possible to obtain table speeds ranging from 4.1 to 150 revolutions per minute.

The illustration shows the Bullard Vertical Turret Lathe with flange mounted motor and also the method of application of the power traverse and rail-raising motors. This application is only one of several mentioned below.



The main drive motor may be either a constant H.P. adjustable speed D.C. motor or a constant H.P. multi-speed A.C. motor having automatic control. To facilitate operation, the power traverse, rail-raising mechanism and cutting lubricating system are each individually motorized. In addition, the lubricating system, by means of its own motor drive, provides pressure lubrication of clean filtered oil to the spindle bearings. The lubricating pump motor is interconnected to the main drive control so that if, for any reason, the pump motor should cease to function, the main drive motor is automatically cut off the line.

All motors are of the ball bearing inclosed type, and the main drive motor may be connected in one of three ways to meet customer's preference. The first method is flange mounting with motor bolted to the side of bed. The second is direct coupled with motor floor mounted, while the third method is drive through chain or V-belt with motor floor mounted or bracket mounted to the rear of the machine.

Several installations of these units are said to have proved their adaptability and successful operation on high-speed requirements by the Bullard Machine Tool Co., Bridgeport, Conn.

Good Helical Gears are not B-O-R-N

....They must be MADE

Beyond the accuracy inherent in the Gear Shaper, you must have ACCURATE CUTTERS—such as ORIGINAL FELLOWS CUTTERS which are UNIFORMLY ACCURATE, because of the highly developed and refined grinding and inspection equipment employed in producing them. . . That assurance of continuously duplicated high accuracy is yours when you standardize on ORIGINAL FELLOWS GEAR SHAPER CUTTERS. Your decision to put "quality first" is both wise and economical, because a single instance of "trouble" in your gear production can occasion a loss that will wipe out any small difference in cutter cost, many times over. . . .

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AND GEAR SHAPER CUTTERS

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The OHIO SEAMLESS TUBE CO.
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Pioneers in Better Drilling Methods
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Single and multiple spindle special drilling, boring, reaming, tapping machine and FOOTBURT Sipp Sensitive Drilling Machines
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DETROIT, 2457 Woodward Ave.

BUYERS' GUIDE

Automotive Products and Factory Equipment Manufactured by Advertisers in This Issue

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Acid, Sulphuric
New Jersey Zinc Co.

Alloys
Ferro
New Jersey Zinc Co.
Non-Ferrous
New Jersey Zinc Co.

Arms & Knuckles, Steering
Atlas Drop Forge Co.

Axles
Atlas Drop Forge Co.
Park Drop Forge Co.

Bearings, Anti-Friction
Ball
New Departure Mfg. Co.

Bearings, Journal Type
Plain
Bunting Brass and Bronze Co.

Bending & Straightening Machines
Chambersburg Engineering Co.
Chambersburg National Co.
Cleveland Punch & Shear Work Co.
National Machinery Co.

Blanks
Forged
Atlas Dorp Forge Co.
Bethlehem Steel Co.
Non-Ferrous
Bunting Brass and Bronze Co.

Bolts and Nuts
National Acme Co.

Boring Machines
Baker Bros., Inc.
Foote-Burt Co.

Brake Drums
Gunite Foundries Corp.
Motor Wheel Corp.

Brakes
Hydraulic
Hydraulic Brake Co.

Bushings
Brass and Bronze
Bunting Brass and Bronze Co.
Fibre
Continental - Diamond Fibre Co.

Camshafts
Atlas Drop Forge Co.
Gunite Foundries Corp.

Castings
Brass and Bronze
Bunting Brass and Bronze Co.
Gray Iron
Gunite Foundries Corp.

Channels for Glass
Felt
American Felt Co.

Clarifiers, Centrifugal
National Acme Co.

Cleaners
Metal
American Chemical Paint Co. (Rust Preventive)

Connecting Rods
Atlas Drop Forge Co.

Crankshafts
Atlas Drop Forge Co.
Park Drop Forge Co.

Cutters
Baker Bros., Inc. (Keyseating)
Fellows Gear Shaper Co. (Gear)

Dashes, Truck
Stolper Steel Products Co.

Die Heads
National Acme Co.

Drilling Machines
Baker Brothers, Inc.
Foote-Burt Co.
Greenlee Bros. & Co. (Multiple Spindle)

Enamels
American Chemical Paint Co. (Rust Proofing)

Felt
American Felt Co.

Fenders
Stolper Steel Products Co.

Fibre Rods, Sheets, Tubes
Continental - Diamond Fibre Co.

Forgings
Atlas Drop Forge Co.
Park Drop Forge Co.

Furnaces, Electric
(Annealing, Carburizing, Heat Treating, Forging and Welding)
Electric Furnace Co.

Gaskets
Felt
American Felt Co.

Gear Cutting Machines
Fellows Gear Shaper Co. (Shapers)

Gear Material
Non-Metallic
Continental - Diamond Fibre Co.

Gears
Timing, Non-Metallic
Continental - Diamond Fibre Co.

Grinding Machines
Fellows Gear Shaper Co.

Hammers
Power
Chambersburg Engineering Co.
Chambersburg National Co.
National Machinery Co.

Hangers
Shafting
New Departure Mfg. Co.

Heat Treating
Barnes Co., Wallace
Barnes - Gibson - Raymond, Inc.
Gibson, Wm. D., Co.

Hoods
Stolper Steel Products Co.

Hose, Flexible Metallic
(Radiator and Fuel Lines)
Titeflex Metal Hose Co.

Hubs
Gunite Foundries Corp. (Wheel)

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EXPANSION PLUGS

FOR CLOSING CORE HOLES

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PHOSPHOR BRONZE SPRINGS A SPECIALTY
SMALL STAMPINGS
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If you are a manufacturer looking for additional sales representatives familiar with industrial selling in the automotive field, *Automotive Industries* will undoubtedly be able to help you find them. Nearly always it is possible for us to suggest some one experienced and successful in this line, in such cities as Detroit, Cleveland, Indianapolis, Chicago or New York. We are always glad to render this service without recompense to us or obligation to you.

If you desire to make arrangements with sales representatives to handle your products in these or other automotive industrial centres, we suggest that you write to

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AMERICAN FELT CO.
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WORCESTER STAMPED METAL CO.
Worcester, Mass.
· QUALITY STAMPINGS ·

BUYERS' GUIDE—Continued

(Continued from page 36)

Instruments, Recording (Idle Time Control)
National Acme Co.

Insulating Material
Continental - Diamond Fibre Co.

Keyseaters
Baker Brothers, Inc.

Lapping Machines
Fellows Gear Shaper Co.

Lathes
Automatic Chucking
Potter & Johnston Machine Co.
Turret
Potter & Johnston Machine Co.

Molded or Machined Parts (Phenolic)
Continental - Diamond Fibre Co.

Name Plates
Auld, D. L., Co.

Oil
Break-In
Acheson Oildag Co.
Lubricating
Acheson Oildag Co.

Pads
Felt
American Felt Co.

Paints
Heat Resisting
American Chemical Paint Co.

Pickling Compounds
American Chemical Paint Co.

Piston Rings
Sealed Power Corp.

Plates, Clutch Pressure
Gunite Foundries Corp.

Plugs
Expansion
Hubbard Spring Co. M. D.

Presses
Chambersburg Engineering Co.
Chambersburg National Co.
Cleveland Punch & Shear Works Co.
National Machinery Co.

Punches
Cleveland Punch & Shear Works Co.

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American Chemical Paint Co.

Rust Removers & Preventives
American Chemical Paint Co.

Screw Machine Products
Barnes Co., Wallace
National Acme Co.

Screw Machines
Greenlee Bros. & Co.
National Acme Co.
Potter & Johnston Machine Co.

Screws
Cap
National Acme Co.
Machine
National Acme Co.
Set
National Acme Co.

Shafting
New Departure Mfg. Co.

Shears
Cleveland Punch & Shear Works Co.

Sheet Metal Machines
Cleveland Punch & Shear Works Co.

Special Machinery
Baker Brothers, Inc.
Greenlee Bros. & Co.

Springs
Extension, Compression, Torsion or Flat
Barnes Co., Wallace
Barnes - Gibson - Raymond, Inc.
Cook Spring Div.
Gibson, Wm. D., Co.
Hubbard Spring Co., M. D.
Mather Spring Co.
Raymond Mfg. Co.
Leaf
Mather Spring Co.

Stampings or Drawings, Metal
Auld, D. L., Co.
Barnes Co., Wallace
Barnes - Gibson - Raymond, Inc.
Cook Spring Div.
Gibson, Wm. D., Co.
Hubbard Spring Co. M. D.
Motor Wheel Corp.
Raymond Mfg. Co.
Stolper Steel Products Co.
Worcester Stamped Metal Co.

Steam Cooling
Rushmore Laboratory

Steel
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Republic Steel Corp.
Bars
Republic Steel Corp.
Carbon
Bethlehem Steel Co.
Republic Steel Corp.
Cold Drawn
Republic Steel Corp.
Electric Furnace
Bethlehem Steel Co.
High Speed
Bethlehem Steel Co.
Sheets
Bethlehem Steel Co.
Spring
Barnes Co., Wallace
Barnes - Gibson - Raymond, Inc.
Gibson, Wm. D., Co.
Stainless
Bethlehem Steel Co.
Republic Steel Corp.
Strip
Republic Steel Corp.

Tank Support Straps
Stolper Steel Products Co.

Tanks
Stolper Steel Products Co.

Tapping Machines
Baker Bros., Inc.
Foote-Burt Co.
Greenlee Bros. & Co.

Threaded Generators
Fellows Gear Shaper Co.

Tubes, Axle, Steering Column & Torque
Ohio Seamless Tube Co.

Tubing
Flexible Metal
Titeflex Metal Hose Co.
Seamless
Ohio Seamless Tube Co.
Steel
Ohio Seamless Tube Co.

Tubular Products
Ohio Seamless Tube Co.

Turret Machines, Automatic
Potter & Johnston Machine Co.

Washers
Felt
American Felt Co.
Plain Metal
Hubbard Spring Co., M. D.

Wheels
Motor Wheel Corp.

Wicks, Felt
American Felt Co.

Wire
Flat, Round, Square or Special Shape
Barnes Co., Wallace
Spring
Barnes Co., Wallace
Republic Steel Corp.

Wrenches
Gunite Foundries Corp.

Zinc, Sheets, Slabs, Sticks, Strip, etc.
New Jersey Zinc Co.

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Bunting offers valuable help in solving the bearing problems which increased horsepower, higher speeds and higher bearing pressures have brought into automobile engineering. The wide experience and advanced technical knowledge of our engineers are freely available to you at any time without obligation.

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BUSHING BEARINGS
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Colloidal Graphite

AERO motor manufacturers, like builders of other types of internal combustion engines, are employing colloidal-graphited assembly and "running-in" lubricants to reduce to a minimum both "limbering-up" time and seizure difficulties.

For details concerning the mechanics of lubrication with colloidal graphite, write for Technical Bulletins Nos. A200 and A113.

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dag
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PORT HURON, MICH.

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These are the twin standards by which articles appearing in *Automotive Industries* are selected. The importance of the men who read the publication makes such selection of paramount interest to them. The readers of *Automotive Industries* are key men in automotive plants; men who control purchasing power. They favor an automotive publication which is terse, accurate, dependable. *Automotive Industries* meets the needs of such men in hundreds of automotive manufacturing plants in the United States and in more than a score of foreign countries.

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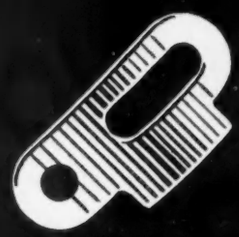


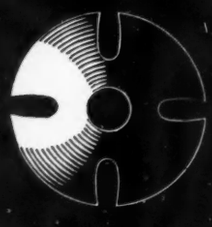
SMALL STAMPINGS

EXTENSION SPRINGS

WIRE FORMS

SCREW MACHINE PRODUCTS

TORSION SPRINGS



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Sealed Power engineers have accumulated priceless experience, data and knowledge. Sealed Power laboratories and engineering co-operation BELONG to the industry. Sealed Power Piston Rings, Pistons and Pins will obtain the maximum in performance and economy. Sealed Power engineers only ask for the opportunity of proving it.

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